Value Engineering Study Report

TH 952A, Robert Street Improvements
SP 1908-84

September 10-13, 2013

Minnesota Department of Transportation
395 John Ireland Blvd
St. Paul, MN 55155

Disclaimer:

The information contained in this report is the professional opinions of the team members during the Value Engineering Study. These opinions were based on the information provided to the team at the time of the study. As the project continues to develop, new information will become available, and this information will need to be evaluated on how it may affect the recommendations and findings in this report. All costs displayed in the report are based on best available information at the time of the study and unless otherwise noted are in 2013 dollars.

This report was prepared by:

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Value Engineering Summary

Introduction

This value engineering (VE) report summarizes the events of the study conducted for the Minnesota Department of Transportation (MnDOT) and facilitated by HDR Engineering, Inc.

The subject of the VE Study was TH 952A, Robert Street Improvements, SP 1908-84. The study was conducted September 10-13, 2013 with the presentation of findings held September 13, 2013.

The primary objective of the team through application of the VE Job Plan (see Appendix E) was to:

- Apply the principles and practices of the VE Job Plan
- Conducted a thorough review and analysis of the project
- Brainstormed and evaluate possible improvement opportunities
- Used a "fresh set of eyes" to search for new/innovative approaches to constructability, construction staging and traffic control
- Identify potential value added and cost saving opportunities.

Value Summary

Project Cost: $22.0 million
Number of Recommendations: 4
Number of Approved Recommendations: 4
Recommended Cost Savings: $0.20 million
Approved Cost Savings: $0.20 million
Recommended Schedule Savings: 6 months
Approved Schedule Savings: 6 months
Total Number of Team Members: 6
MnDOT Employees: 4
Others: 2
Facilitator: HDR Engineering, Inc.

VE Recommendations

The recommendations are briefly described below and are described in detail in the Recommendations section of the report.

1 – Use Traffic Barrels **$0.20 M savings**

Replace the temporary concrete barrier with traffic barrels to separate traffic from the work zone and to delineate business access. This recommendation mitigates construction impacts.

2 – Contractor/Business Weekly Meetings **Not Quantified**

Have the contractor designated someone, most likely the foreman or superintendent, who will give weekly updates to business owners of the expected work for that week. This recommendation mitigates construction impacts.

3a – Relocate Utilities First **Reduces 6 months of construction duration**

Develop an order of work or first order of work contract provision that requires completing the installation of the water main work along with the proposed sanitary sewer pipe and manhole replacements prior to starting work within that section of Robert Street. This recommendation mitigates construction impacts and will reduce the overall contract duration.

3b – Risk Mitigation - Separate Water Main Contract **Reduces risk of delay**

If right-of-way acquisition is delayed, then advertise and let a separate construction project specifically for the installation of the water main associated with the Robert Street Improvement Project. This is a response strategy to the risk that the right-of-way will not be acquired by the project letting in April 2014 and that the project will be delayed until the right-of-way certification is approved by FHWA. This recommendation mitigates construction impacts and mitigates an identified project risk.

4 – Innovative Contracting **Reduces 6 months of construction duration**

To receive the best "value" for the project, incorporate innovative contracting methods within the design-bid-build project delivery to reduce the overall duration of the project. This recommendation mitigates construction impacts and will reduce the overall project duration.

In addition to the recommendations above, the VE Team generated several ideas that they felt were important enough to be documented as design considerations for further consideration by the Project Team. These design considerations are summarized in the Recommendations section of the report.

The VE Team wishes to express its appreciation to the project design team and management for the excellent support they provided during the study. These recommendations and other ideas provided will assist in the management decisions necessary to move the project forward.

Blane Long, CVS, CCT
VE Team Leader

Introduction

This report summarizes the events of the VE Study conducted for MnDOT and facilitated by HDR Engineering, Inc. The subject of the study was the TH 952A, Robert Street Improvements – SP 1908-84.

Project Background

Robert Street is a trunk highway facility (TH 952A) owned by MnDOT and provides the major north-south thoroughfare for West St. Paul. The roadway is classified as a minor arterial. The project termini is Mendota Road to the south and Annapolis Street to the north. The existing configuration between Mendota Road and Butler Avenue, Robert Street is a 5-lane undivided roadway with no on street parking. From Butler Avenue to Annapolis Street, Robert Street is a 3-lane undivided roadway with parking on both sides.

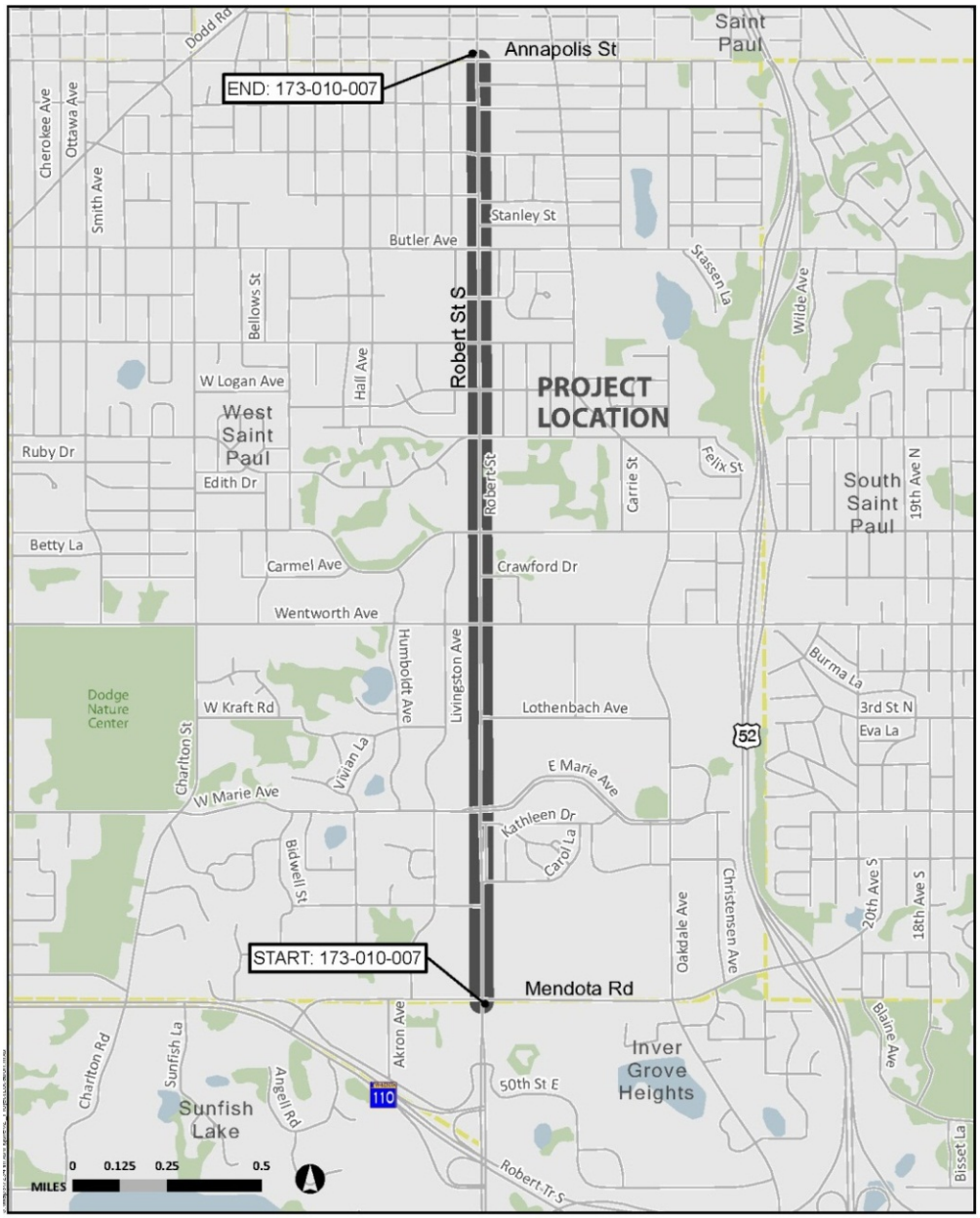

Figure 1 – Project Location

VE Study Timing

The study was conducted September 10-13, 2013. The project was at 60% design at the time of the study.

Scope of the VE Study

The scope of the VE Study was to verify or improve upon concepts being proposed for the project. To accomplish this, the VE Team:

- Applied the principles and practices of the VE Job Plan
- Conducted a thorough review and analysis of the project
- Brainstormed and evaluated possible improvement opportunities
- Used a "fresh set of eyes" to search for new/innovative approaches to constructability, construction staging and traffic control
- Identified potential value added and cost saving opportunities.

VE Team Members

The VE Team included:

- Michael Arseneau — Design
- Tiffany Dagon — Traffic
- Curtiss Kallio — Construction
- Blane Long — VE Team Leader
- Josh Metcalf — Design/Construction
- Almin Ramic — Geometrics

Project Description

Introduction

Robert Street (Trunk Highway 952) is the main north/south transportation route through the heart of the commercial business district in West St. Paul. It is an approximately 2.4 mile route, classified as an A Minor Arterial Street and is under the jurisdiction of the Minnesota Department of Transportation (MnDOT).

From Mendota Road at the south end of the City to Butler Avenue on the north end of the City, Robert Street exists as a 5-lane undivided roadway with no parking on either side and Average Daily Traffic (ADT) ranging from 16,000 to 26,000 vehicles (per 2009 ADT maps). From Butler Avenue to the north City limit line at Annapolis Street, Robert Street is a 3-lane undivided roadway with parking permitted on each side and 16,000 vehicles ADT.

Throughout the corridor, but especially in the southern two-thirds, there are numerous driveways along both sides of the street. In some areas the driveways are spaced just 50 feet apart. Because of these closely spaced driveways, the crash rates along Robert Street are higher than average when compared to other undivided Trunk Highways in the metro area.

The purpose of the project is to reconstruct Robert Street to improve safety and mobility and provide accommodations to meet the Americans with Disabilities Act (ADA) standards. The project will convert two-way left turn lanes into a median, add travel lanes north of Butler Street by removing parking, add turn lanes and improve sidewalks.

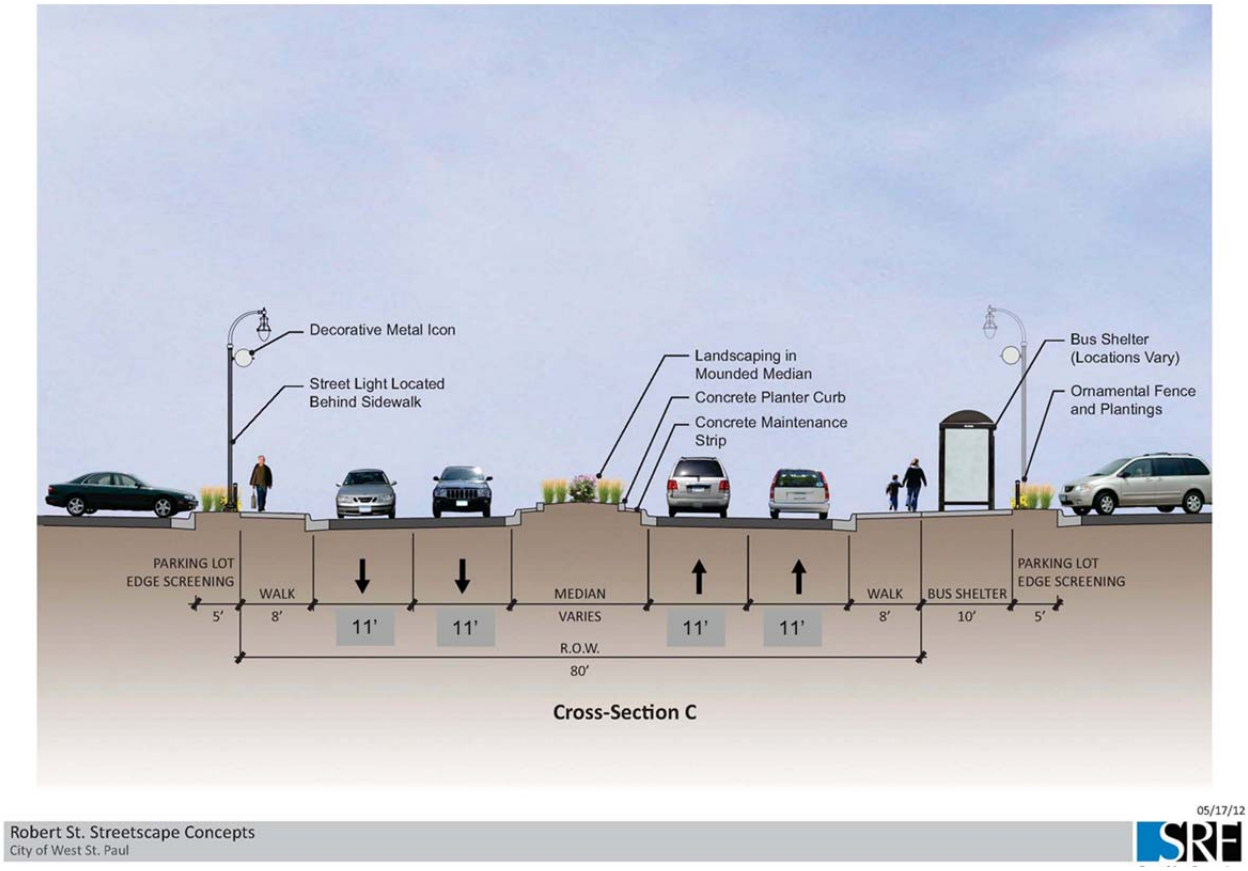

Figure 2 – Typical Section

The project will also reconstruct the storm sewer network, replace traffic signals, replace street lighting, and install other streetscape elements. The project is intended to improve the entire length of Robert Street in West St. Paul in four categories:

Infrastructure

- Milling/overlay of the existing bituminous pavement surface
- Replacement of broken/deteriorated concrete curb sections
- Storm sewer upgrading/replacement
- Improvements to public utilities (sanitary sewer and water mains) as needed.

Safety

- Adding a raised median down the existing center turn-lane
- Providing additional capacity in each direction on the north end of Robert Street between Butler and Annapolis
- Intersection improvements including widening radii, signal upgrades, additional dedicated turn lanes to Robert Street from select side streets
- Consolidation of driveways where appropriate.

Aesthetics

- Replacing the existing street lights with a more efficient and aesthetic light system
- Adding a "green element" along Robert Street through the use of boulevard trees and landscaping elements within the corridor.

Transit

- Ensuring the design can accommodate possible future street car lines or bus rapid transit within the outer travel lane.

Constraints and Controlling Decisions

As part of the project briefing, the VE Team was given the following project constraints and controlling decisions that needed to be taken into account when considering possible alternatives:

- 80 feet of right-of-way
- Project needs to be let by April 2014
- Maintain 2 lanes in one direction on Robert Street during construction and detour for the other direction
- Maintain access to businesses during construction
- Maintain a business detour during construction
- Maintain a bypass detour during construction
- Maintain a bus detour during construction
- Maintain pedestrian path during construction.

Stakeholder Concerns

- Work needs to begin in 2014
- Drivers and pedestrians will be guided in a clear and appropriate manner through the work zone and to businesses
- Minimize community impacts by completing work efficiently while maintaining quality construction requirements
- Late bid opening in April 2014 may reduce number of bidders and increase prices.

Investigation Observations

The first day of the study included a presentation from the Project Team. The following summarizes key project issues, project drivers, and observations identified during these sessions:

- Drivers making illegal turns
- Sidewalks in disrepair
- Pavement cracking (due to concrete panels)
- Pavement failures/fatigue
- A lot of driveways (businesses)
- Transit/pedestrian activity
- The north end (north of Butler Avenue) is different than the rest of project (residential vs. business)
- Pedestrians with disabilities
- Some driveways went nowhere
- The contractor will dig/backfill the trench for the water main but St. Paul Water Service will lay the pipe.

Project Cost Estimate

The VE Team was provided a design cost estimate (opinion of cost) prior to the study. The VE Team noted that the quantities within the cost estimate did not necessarily reflect the 60% design review set of plans that was also provided to the VE Team. It was the opinion of the VE Team that the design has progressed to 60% and the current estimate has not been updated yet to account for the added scope and quantities. Where applicable, the Team used the unit bid prices provided within the cost estimate and obtained quantities from the 60% plans.

Table 1 – Cost Estimate Summary

Category	Subtotal	% of Total
Roadway	$4.09 M	24.9%
Streetscape	$4.06 M	24.6%
Traffic Signals	$1.93 M	11.7%
Storm Sewer	$1.88 M	11.4%
Water Main	$1.31 M	7.9%
Contingency	$1.14 M	6.9%
Mobilization	$0.75 M	4.6%
Sanitary Sewer	$0.65 M	3.9%
Traffic/Erosion Control	$0.45 M	2.7%
Retaining Walls	$0.22 M	1.3%
Construction Total	**$16.47 M**	**100%**

Project Schedule

The project is scheduled to be advertised in January 2014 with a bid opening in April 2014. The expected construction start is June 2014 with the project being completed in 2017 (3.5 years duration).

Information Provided to the VE Team

The following project documents were provided to the VE Team for their use during the study:

Table 2 – Information Provided to VE Team	
Document	**Date**
Plan View 1B Layout South Section	July 2013
Plan View 1B Layout North Section	July 2013
Profile 1B Layout	July 2013
Preliminary Cost Estimate	August 2013
Design Verification Meeting Minutes	October 2011
ADA Meeting Minutes	April 2012
Water Resources Design Meeting minutes	July 2012
Attachment G-1 2014 Alternate Routes	No date
Attachment G-2 2015 Alternate Routes	No date
Attachment G-3 2016 Alternate Routes	No date
CONDAC Meeting PowerPoint Presentation	August 2013
Construction Plan View sheets	August 2013
Project Memorandum	No date
Robert Street Intersections Plan Views	July 2013
60% Agency Review Set	August 2013
Construction Staging/Sequencing Review	August 2013
Draft Project Memorandum	No date

Project Analysis

Summary of Analysis

The following analysis tools were used to study the project:

- Cost Model
- Performance Attributes
- Performance Attribute Matrix
- Functional Analysis
- FAST Diagram

Cost Model

The VE Team Leader prepared a cost model from the cost estimate provided to the team.

The cost model is organized to identify major construction elements or trade categories, and the percent of total project cost for the significant cost items. Figure 3 demonstrates that reconstruction of the roadway and the streetscape, which includes the lighting, is over 50% of the project.

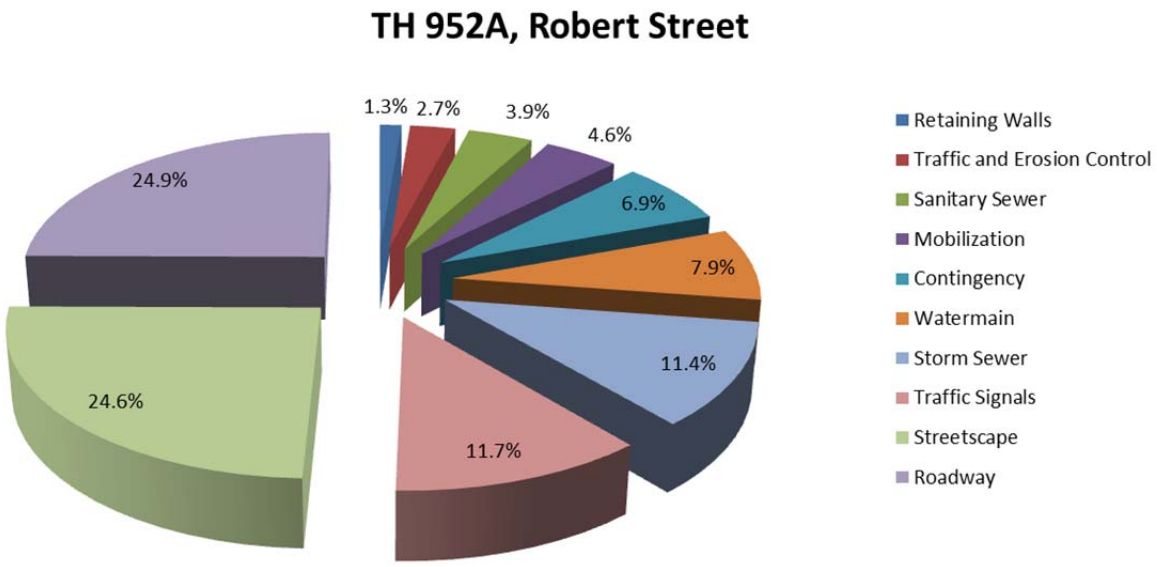

Figure 3 - Cost Model

Performance Attributes

Performance attributes an integral part of the value engineering process. The performance of each project must be properly defined and agreed upon by the Project Team, VE Team and stakeholders at the beginning of the each study. These attributes represent those aspects of a project's scope and schedule that possess a range of potential values.

The VE Team, along with the Project Team, identified and defined the performance attributes for this project and then defined the baseline concept as it pertains to these attributes. The following performance attributes were used throughout the study to identify, evaluate, and document ideas and recommendations.

Table 3 - Performance Attributes		
Performance Attribute	**Definition**	**Baseline**
Mainline Operations	An assessment of traffic operations and safety on the TH 952A, Robert Street within the project limits. Operational considerations include level of service relative to the 20-year traffic projections, as well as geometric considerations such as design speed, sight distance, and lane and shoulder widths.	Design/Posted Speed = 40 MPH south of Marie Avenue, 35 MPH north of Marie Avenue 4- 11' driving lanes (doesn't include gutter) 11' left & right turn lanes Raised center median – width varies (4' -15') Enhanced U-turns to allow larger passenger vehicle at the following intersections at Mendota Road, Marie Avenue, Wentworth Avenue & Butler Avenue.
Local Operations	An assessment of traffic operations and safety on the local roadway infrastructure (cross streets). Operational considerations include level of service relative to the 20-year traffic projections; geometric considerations such as design speed, sight distance, lane and shoulder widths; bicycle and pedestrian operations and access.	5' sidewalks (4' wide at obstructions) 2'-4" paved boulevard between sidewalk and back of curb Meet all ADA requirements WB-50 design vehicle for turning movements Space provided for bus shelters in addition to the existing condition.
Maintainability	An assessment of the long-term maintainability of the transportation facility(s). Maintenance considerations include the overall durability, longevity and maintainability of pavements, structures and systems; ease of maintenance; accessibility and safety considerations for maintenance personnel.	4" minimum mil and overlay Bituminous Surface Mid block left turns are difficult to maintain Landscape in median (irrigation) Lack of snow storage All but one storm sewer outlet is on the outside

Table 3 - Performance Attributes		
Performance Attribute	**Definition**	**Baseline**
Construction Impacts	An assessment of the temporary impacts to the public during construction related to traffic disruptions, detours and delays; impacts to businesses and residents relative to access, visual, noise, vibration, dust and construction traffic; environmental impacts.	Left turns at driveways and cross streets would be allowed Right turns for delivery trucks would be allowed Two lanes of traffic in one direction during construction. The traffic going in the opposite direction would be diverted to alternate routes. Night time work is allow with a variance to the noise ordinance Weekend work is part of the base schedule Multiple detours (business & around) Temporary pedestrian route with accessible pedestrian signals
Environmental Impacts	An assessment of the permanent impacts to the environment including ecological (i.e., flora, fauna, air quality, water quality, visual, noise); socioeconomic impacts (i.e., environmental justice, business, residents); impacts to cultural, recreational and historic resources.	144 parcels need some kind of acquisition: • Permanent easements • Temporary easements • Fee Acquisition Medium risk of some contaminated soils No noise walls
Project Schedule	An assessment of the total project delivery from the time as measured from the time of the VE Study to completion of construction.	Letting – April 2014 Begin Construction – June 2014 3.5 year construction duration 2014 - Construct ancillary improvements off Robert Street, including parallel route improvements, temporary signals and shared access. In addition, construct Robert Street between Annapolis and Butler. 2015 – Construct Robert Street from Butler to Wentworth. 2016 - Construct Robert Street from Wentworth to Mendota Rd. 2017 - Final clean up, punch list items, remaining landscaping.

Performance Attribute Matrix

A matrix was used to determine the relative importance of the individual performance attributes for the project. The Project and VE Teams evaluated the relative importance of the performance attributes that would be used to evaluate the creative ideas.

These attributes were compared in pairs, asking the question: "Which one is more important to the purpose and need of the project?" The letter code (e.g., "A") was entered into the matrix for each pair. After all pairs were discussed they were tallied (after normalizing the scores by adding a point to each attribute) and the percentages calculated.

Table 4 - Performance Attribute Matrix

Which attribute is more important to the outcome of the project?							**TOTAL**	**%**
Mainline Operations	**A**	A/B	A	A	A	A	5.5	26.2%
Local Operations		**B**	B	B	B	B	5.5	26.2%
Maintainability			**C**	C	C	F	3.0	14.3%
Construction Impacts				**D**	D	D	3.0	14.3%
Environmental Impacts					**E**	F	1.0	4.8%
Project Schedule						**F**	3.0	14.3%
							21.0	100%

Functional Analysis

Functional analysis results in a unique view of the project. It transforms project elements into functions, which moves the VE Team mentally away from the original design and takes it toward a functional concept of the project.

Functions are defined in verb-noun statements to reduce the needs of the project to their most elemental level. Identifying the functions of the major design elements of the project allows a broader consideration of alternative ways to accomplish the functions. The major functions identified by the team were:

- Reduce conflicts
- Reduce collisions
- Improve corridor image
- Accommodate users
- Reduce congestion
- Improve mobility
- Reduce maintenance costs (lighting/signals)
- Improve economic vitality.

Table 5 shows the functions associated with the major items of work as defined by the cost model. The costs shown are the original cost from the estimate provided to the Team for comparison purposes only.

Table 5 - Functional Analysis				
Major Items	**Verb**	**Noun**	**Cost**	**% of Project**
Roadway	Support Prepare	Load Site	$4.09 M	24.9%
Streetscape	Provide Illuminate Control Create Improve	Shelter Roadway Erosion Path Aesthetics	$4.06 M	24.6%
Traffic Signals	Control Direct	Traffic Traffic	$1.93 M	11.7%
Storm Sewer	Convey Control	Water Flow	$1.88 M	11.4%
Water Main	Supply	Water	$1.31 M	7.9%
Contingency	Mitigate	Risk	$1.14 M	6.9%
Mobilization	Mobilize	Equipment	$0.75 M	4.6%
Sanitary Sewer	Convey	Wastewater	$0.65 M	3.9%
Traffic/Erosion Control	Maintain Reduce	Traffic Erosion	$0.45 M	2.7%
Retaining Walls	Retain	Earth	$0.22 M	1.3%

FAST Diagram

The Functional Analysis System Technique or FAST diagram arranges the functions in logical order so that when read from left to right; the functions answer the question “How?” If the diagram is read from right to left, the functions answer the question “Why?” Functions connected with a vertical line are those that happen at the same time as, or are caused by, the function at the top of the column.

The FAST Diagram for this project shows Improve Mainline Operations and Improve Local Operations as the basic functions of this project. Key secondary functions included Maintain Traffic and Relocate Utilities. This provided the VE Team with an understanding of the project design rationale and which functions offer the best opportunity for cost or performance improvement.

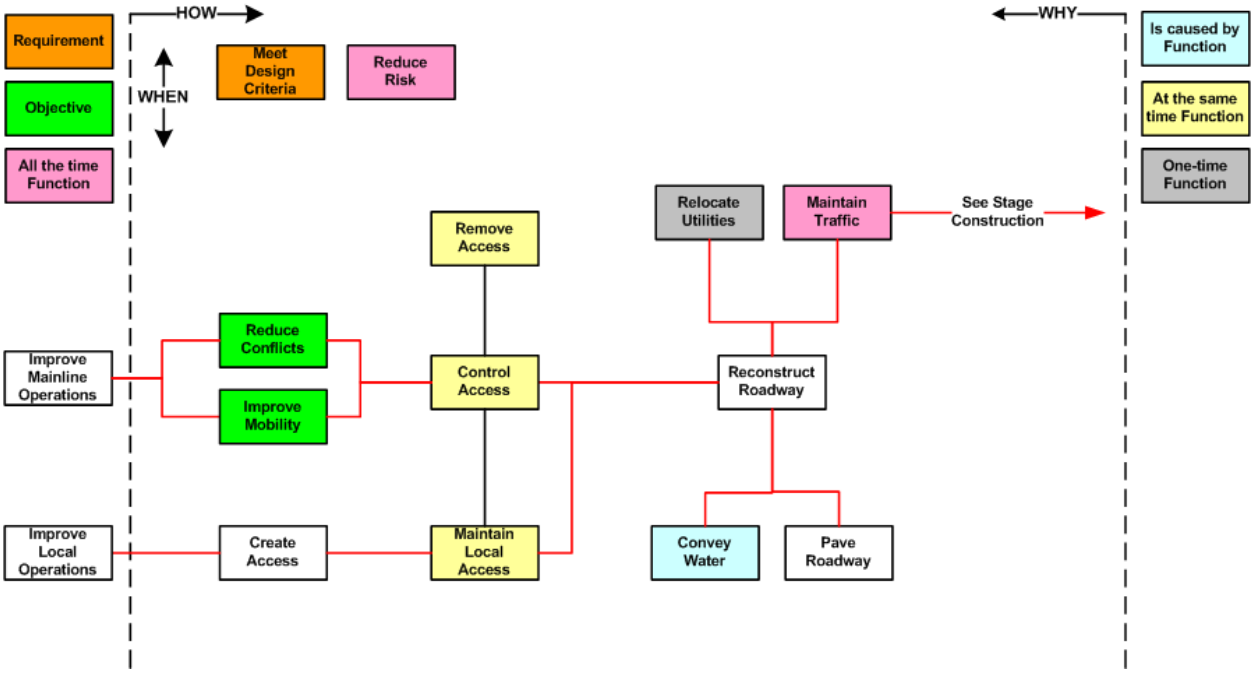

Figure 4a – FAST Diagram

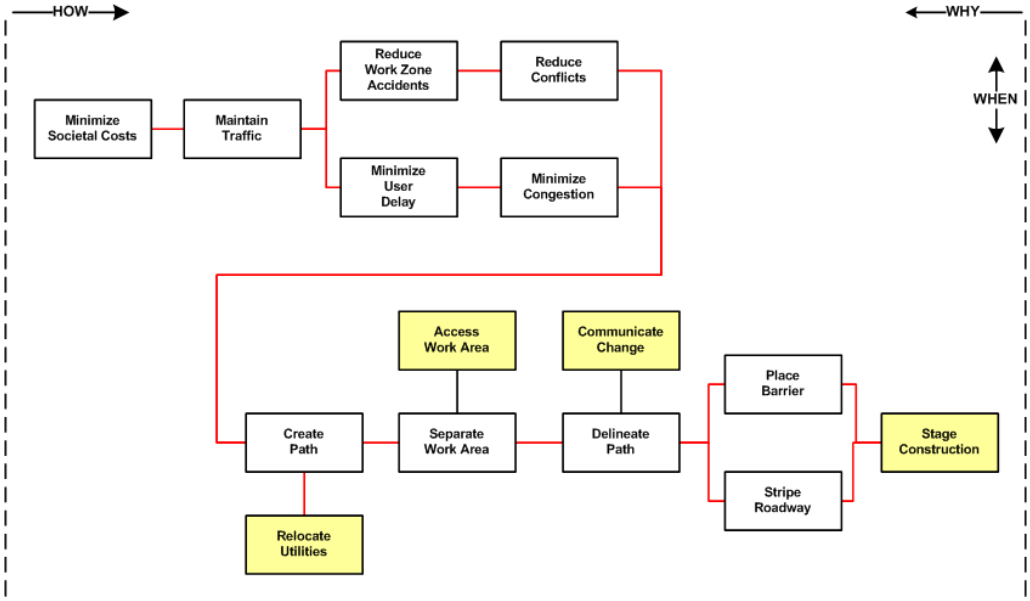

Figure 4b – Stage Construction FAST Diagram

Speculation

During the speculation or creative phase of the VE Job Plan, the VE Team brainstormed ideas on how to perform the various functions. These ideas were based on the available information given to them at the time of the study, taking into consideration the constraints and controlling decisions that were also given to them.

The ideas listed below coincide with each function being considered:

Function: Maintain Traffic (through the corridor)

- One lane each direction with no signed bypass detour, no left turns
- Same as baseline but move traffic to middle and construct the outsides first
- Full closure (one block at a time)
- Full closure (entire section)
- Move traffic (2 lanes each direction) to outside and construct center of roadway first
- Move traffic to middle (2 lanes each direction) and construct all the utilities and sidewalks first
- Eliminate temporary barrier and reduce construction speed to 25 MPH
- Sign the bypass route only once, cover signs in winter
- Allow A+B bidding to shorten the project duration
- Allow the contractor to modify the traffic control, etc. with approval
- Constructability review using contractors ASAP
- Cut back the details, proposed stages, let the contractor determine the traffic control based upon the constraints (performance specs)
- Use ATC for the traffic control work, give the staging plans to the contractor prior to bidding
- Use “Best Value” bidding process
- Utilize the existing signal poles for temporary signals as much as possible
- Use temporary roundabouts instead of temporary signals
- Construct curb to curb on one side of roadway (eliminate one stage).

Function: Maintain Traffic (to businesses)

- Maintain 2 lanes in one direction with no left turns and provide a frontage against the business to provide access
- Contact individuals with disabilities to identify their needs
- Have the contractor conduct a Monday morning meeting with the businesses.

Function: Relocate Utilities

- Eliminate underground utility work as part of the project
- Have the water main work start early, prior to contract
- Use a “joint utility trench” for all the dry utilities under the sidewalk
- Utility work is completed in 2014 before roadway work begin.

Function: Improve Constructability

- Expand the right-of-way to 100 feet
- Use full roadway closures
- Close side streets during construction
- Use a separate contract to relocate utilities
- Streamline the approval process to begin construction earlier in 2014
- Provide a contractor staging area
- Allow reclaim for Class 5 material or other materials (bedding/borrow)
- Conduct a pre-bid meeting to discuss the project with the plan holders.

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Evaluation

Although each project is different, the evaluation process for each VE effort can be thought of in its simplest form as a way of combining, evaluating, and narrowing ideas until the VE Team agrees on the proposals to be forwarded.

Taking into consideration the constraints and controlling decisions, the team discussed each idea and documented the advantages and disadvantages. Each idea was then carefully evaluated with the VE Team reaching consensus on the overall rating of the idea (zero through five). High-rated ideas (four or higher) were developed further; those that were considered to be equivalent to the baseline (rated three) were documented as design considerations; and low-rated ones (two or lower) were dropped from further consideration; however, the team provided a short description and justification to support the low rating. The rating values are shown below:

5 = Great Opportunity
4 = Good Opportunity
3 = Design Consideration (comparable to Project Team's approach)
2 = Minor Value Degradation
1 = Major Value Degradation
0 = Fatal Flaw (unacceptable impact or doesn't meet the project purpose and need)

= Advanced as recommendation

= Forwarded as design consideration

= Dropped from future consideration

Function: Maintain Traffic (entire corridor)

#	Description	Advantages	Disadvantages
1	One lane each direction with no signed bypass detour, no left turns (all temporary access is right-in/right-out)	• Eliminates bypass detour	• Business community may not like • Busses will still need to stop • Emergency response • Difficulty to enforce • Increase signing

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
			👎👍		

Rating:	Justification/Comments/Disposition:
2	*This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
2	Same as baseline but move traffic to middle and construct the outsides first (sidewalks & utilities)	• May eliminate one stage of construction	• Need to maintain more temporary accesses at the same time • Increased need for pedestrian access during construction • Additional night time closures for storm sewer crossings • Difficult for contractor to work both sides at same time

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
1	*This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
3	Full closure - one block at a time (But business still have access)	• Should reduce construction duration • May reduce cost	• Businesses may object • Increases traffic detours/signing etc. • Increased congestion • Local infrastructure may not be able to support added vehicles

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
2	*A block is considered to be from cross-street to cross-street that can access Oakdale Avenue. This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
4	Full closure (entire section)	• Should reduce construction duration • May reduce cost	• Businesses may object • Increases traffic detours/signing etc. • Increased congestion • Local infrastructure may not be able to support added vehicles

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
1	*This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
5	Move traffic (2 lanes each direction) to outside and construct center of roadway first	• Lessens need for bypass detour • Maintains 2 lanes each direction for longer periods of time	• Storm sewer crossing need to be constructed first • Slower construction than the baseline • May need to reduce to one lane each direction during sanitary sewer replacement

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
1	*Stage 1 construct inside, stage 2 construct outside, stage 3 grind and pave at night.* *This idea uses monolithic curb in the median and the sanitary sewer is replaced first. This idea was dropped from further consideration. In correcting the crown of the roadway the median needs to be excavated and replaced which negates the use of monolithic curb and requires a wider footprint.*

#	Description	Advantages	Disadvantages
6	Move traffic to middle (2 lanes each direction) and construct all the utilities and sidewalks first	• Lessens need for bypass detour • Maintains 2 lanes each direction for longer periods of time	• Storm sewer crossing need to be constructed first • Slower construction than the baseline • May need to reduce to one lane each direction during sanitary sewer replacement

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
1	*Same as previous idea just reorder of stages, no left turns during stage one. This idea was dropped*

	from further consideration.

#	Description	Advantages	Disadvantages
7	Eliminate temporary barrier	• Eliminates cost and time relocating barrier • Provides 4' of additional width • Eliminate multiple snagging of vehicle • Makes it easier for materials and equipment to move to and from the work area	• May increase conflict between workers and traffic

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
4	*Will still need some barrier adjacent to open trenches if in close proximity to traffic. This idea was moved to further development.*

#	Description	Advantages	Disadvantages
8	Sign the bypass route only once, cover signs in winter	• Reduces cost • Coordination with Dakota County	• Stakeholders may not like • Different directions (NB vs. SB)

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
9	Allow A+B bidding to shorten the project duration	• Reduce construction duration	• Tight budget with complex funding mechanism

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
4	*A = cost and B = duration. This idea was moved to further development. Combine with ideas 13, 14, 32*

#	Description	Advantages	Disadvantages
10	Allow the contractor to modify the traffic control, etc. with approval		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
	Baseline idea

#	Description	Advantages	Disadvantages
11	Conduct a constructability review using contractors ASAP	• May learn improved ways to save cost and time • Improve the bid-ability of the plans	• Time to implement ideas – if major revisions are needed

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
3	*Use retired contractors as the team. Design Consideration*

#	Description	Advantages	Disadvantages
12	Cut back the staging details, and let the contractor determine the traffic control based upon the constraints (performance specs)	• Allows for contractor innovation • May save cost & time	• Difficult for contractor (prime & sub) to bid • May add to bid duration

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
13	Use ATC for the traffic control work, give the staging plans to the contractor prior to bidding	• Allows for contractor innovation • Agency gets 100% of savings	• Need to have the plans available to the bidders early • May delay letting • New to design-bid-build

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
4	*Combine with Ideas 9, 14, 32*

#	Description	Advantages	Disadvantages
14	Use "Best Value" bidding process		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
4	*Combine with Ideas 9, 13, 32*

#	Description	Advantages	Disadvantages
15	Utilize as much as possible the existing signal poles for temporary signals	• May reduce cost	• May not work in all location • The existing poles may not be tall enough

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
16	Use temporary roundabouts instead of temporary signals	• May improve traffic flow during construction • Eliminates need for temporary signals	• Makes reconstruction of intersection more difficult • Will not work at more intersection

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
			👎		

Rating:	Justification/Comments/Disposition:
2	*This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
17	Construct ~~outside curb to median curb on one side of roadway (eliminates one stage)~~ the project in two stages eliminating the 3rd stage and utilize monolithic curb to reduce excavation	• Reduces construction time • Minimize impacts to users • Reduces excavation	• May add cost for curbing

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

Function: Maintain Traffic (to businesses)

#	Description	Advantages	Disadvantages
18	Maintain 2 lanes in one direction with no left turns and provide a frontage road against the businesses to provide access		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
1	*Addressed within previous ideas and the baseline. This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
19	Contact individuals with disabilities (pedestrians) to identify their needs		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
	Reasonable access for pedestrians will be maintained to all businesses as part of the baseline.

#	Description	Advantages	Disadvantages
20	Have the contractor conduct a Monday morning meeting with the businesses during construction	• Builds a better relationship between the contractor and the businesses	• None noted

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
4	*This idea was moved to further evaluation and development.*

Function: Relocate Utilities

#	Description	Advantages	Disadvantages
21	Eliminate underground utility work as part of the project		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
0	*Fatally flawed because the utilities are a part of the current scope of this project. This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
22	Have the water main work start early (separate contract), prior to contract	• Utility work doesn't affect the staging • Reduce risk for the 2014 work • Temporary water connections are a big risk to the contractor • Allows work to begin even if ROW is delayed	• Some business access will be impacted multiple times • 2-3 months more traffic control • Coordination issues with two contractor • Two contracts to administer • Additional patching required

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
4	*Risk management strategy to insure work begins in 2014. This idea was moved to further evaluation and development.*

#	Description	Advantages	Disadvantages
23	Use a "joint utility trench" for all the dry utilities under the sidewalk	• Assists in maintaining the schedules • Reduce overall construction duration • Less equipment within work zone	• May add to cost of project

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
24	Utility work is completed first before roadway work begins	• Utility work doesn't affect the staging • Reduce risk for the 2014 work • Temporary water connections are a big risk to the contractor • Keeps more lanes of traffic open on Robert Street for the first year • Better coordination between subcontractor	• Some business access will be impacted multiple times • Additional patching required • Nothings appears finished • Second and third year there is multiple operations

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
					

Rating:	Justification/Comments/Disposition:
4	*This idea was moved to further evaluation and development.*

Function: Improve Constructability

#	Description	Advantages	Disadvantages
25	Expand the right-of-way to 100		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
0	*Fatally flawed. No additional right-of-way will be acquired beyond what has already been identified. This idea was dropped from further consideration.*

#	Description	Advantages	Disadvantages
26	Use full roadway closures		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating: 0	Justification/Comments/Disposition:
	Fatally flawed. The surrounding infrastructure (roadways) cannot handle the additional capacity of a full closure of Robert Street. This idea was dropped from further consideration.

#	Description	Advantages	Disadvantages
27	Close non-signalized intersections during construction in the vicinity	• Can construct half at a time vs. one-quarter at a time • Improved traffic flow on mainline • Removes turning conflicts	• Loss of access • Additional vehicle through signalized intersection • Emergency response times may increase

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
			👎		👍

Rating: 3	Justification/Comments/Disposition:
	Baseline assumes 1 – 5 day closure this idea assumes closure until majority of work is completed (non bituminous idea). Design consideration to increase the length of closures.

#	Description	Advantages	Disadvantages
28	Use a separate contract to relocate utilities		

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating: 4	Justification/Comments/Disposition:
	Same as Idea 22

#	Description	Advantages	Disadvantages
29	Streamline the approval process to begin construction earlier within 2014	• Ability to have letting occur earlier in the year	• Streamline approval may miss items resulting in change orders

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating: 1	Justification/Comments/Disposition:
	Not possible under the current review/approval process. The baseline is to complete the plans ASAP. This idea was dropped from further consideration.

#	Description	Advantages	Disadvantages
30	Provide (secure) contractor staging areas	• Levels the bidding environment	• None noted

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
31	Allow the use of reclaimed material for Class 5 material or other materials (bedding/borrow)	• Lower cost • Green footprint	• May require relaxation of standard specs • May require a stockpile location within close proximity

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule

Rating:	Justification/Comments/Disposition:
3	*Design Consideration*

#	Description	Advantages	Disadvantages
32	Conduct a pre-bid meeting to discuss the project with the plan holders	• Builds a better relationship between the contractor and the agency	• None noted

Mainline Operations	Local Operations	Maintainability	Construction Impacts	Environmental Impacts	Project Schedule
			👍		

Rating:	Justification/Comments/Disposition:
4	*Combine with Ideas 9, 13, 14.*

Recommendations

The VE Recommendations are presented as written by the team during the VE Study. While they have been edited from the VE report to correct errors or better clarify the recommendation, they represent the VE Team's findings during the VE Study. The following table is a summary of all recommendations generated and their impact to the project.

Table 6 - Summary of Recommendations				
#	**Description**	**Cost Savings**	**Schedule Savings**	**Performance**
1	Use Traffic Barrels	$0.20 M	1-2 weeks	9%
2	Contractor/Business Weekly Meetings	None	None	3%
3a	Relocate Utilities First	N/Q	6 months	11%
3b	Risk Mitigation – Separate Utility Contract	N/Q	N/Q	9%
4	Innovative Contracting	N/Q	6 months	11%
	Total	**$0.20 M**		

NQ = Not quantifiable at this time

The cost comparisons reflect a difference or delta between the baseline idea and the VE Recommendation. As the project progresses, these values can be updated to reflect actual implemented results. These values shown have been adjusted by 10% to reflect the additional ***cumulative*** costs of:

Table 7 – Cost Estimate Markups	
Markup	**Percentage**
Miscellaneous Item Allowance	5%
Mobilization	5%
Total Markup	**10%**

Performance Assessment

As the VE Team developed recommendations, the performance of each is rated against the baseline concept. Changes in performance are always based upon the overall impact to the total project. Once performance and cost data have been developed by the VE Team, the net change in value of the VE recommendations can be compared to the original design concept.

In order to compare and contrast the potential for value improvement, individual recommendations are compared to the baseline project for all attributes. For this exercise the baseline was given a score of 5. The resulting value improvement scores allow a way for MnDOT to assess the potential impact of the VE recommendations on total project value.

Table 8 – Value Matrix													
TH 952A, Robert Street Improvements - SP 1908-84													
Attribute	**Attribute Weight**	**Concept**	**Performance Rating**										**Total Performance**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Mainline Operations	26.2	Baseline					5						131
		1					5						131
		2					5						131
		3a					5						131
		3b					5						131
		4					5						131
Local Operations	26.2	Baseline					5						131
		1					5						131
		2					5						131
		3a					5						131
		3b					5						131
		4					5						131
Maintainability	14.3	Baseline					5						71
		1					5						71
		2					5						71
		3a					5						71
		3b					5						71
		4					5						71
Construction Impacts	14.3	Baseline					5						71
		1							7				100
		2						6					86
		3a							7				100
		3b							7				100
		4							7				100
Environmental Impacts	4.8	Baseline					5						24
		1					5						24
		2					5						24
		3a					5						24
		3b					5						24
		4					5						24
Project Schedule	14.3	Baseline					5						71
		1						6					86
		2					5						71
		3a							7				100
		3b						6					86
		4							7				100

Understanding the relationship of cost, performance, and value of the project baseline and VE recommendations is essential in evaluating VE recommendations. Comparing the performance and cost suggests which recommendations are potentially as good as or better than, the project baseline concept in terms of overall value.

Table 9 – Value Matrix Results							
OVERALL PERFORMANCE		Performance (P)	% Change Performance	Cost (C)	% Change Cost	Value Index (P/C)	% Value Improvement
	Baseline	500		$15.3		32.62	
1	Eliminate Temporary Barrier	543	9%	$15.1	1%	35.88	10%
2	Contractor/Business Weekly Meetings	514	3%	$15.3	0%	33.55	3%
3a	Relocate Utilities First	557	11%	$15.3	0%	36.34	11%
3b	Risk Mitigation – Separate Utility Contract	543	9%	$15.3	0%	35.41	9%
4	Innovative Contracting	557	11%	$15.3	0%	36.34	11%

Recommendations

The results of this study are presented as individual recommendations to the original concept or baseline.

Each recommendation consists of a summary of the baseline, a description of the recommendation, a listing of its advantages and disadvantages, and a brief narrative that includes justification, sketches, photos, assumptions and calculations (where applicable) as developed by the VE Team.

Performance measures are calculated by rating, on a scale of 1 to 10, the overall project against each of the weighted criteria to arrive at a total score (rating times weight, and totals for all criteria added together). The difference between the recommendation and the baseline is expressed as a percentage.

The cost comparisons reflect a comparable level of detail as in the estimate provided to the VE Team.

Design Considerations

In addition to the recommendations above, the VE Team generated a number of ideas that they felt were important enough to be documented and should be further considered by the Project Team.

- For the 2014 and 2015 construction seasons, sign the bypass route only once, cover signs in winter.
- Conduct a constructability review using retired contractors.
- Cut back the staging details, and let the contractor determine the traffic control based upon the performance specifications – would require lump sum traffic control.
- Utilize to the extent possible the existing signal systems for temporary signals. Guys can be hung between poles; signals and other resources may be reused in a temporary configuration.
- Construct the project in two stages, eliminating the 3rd stage, and utilize monolithic curb to reduce excavation. Using monolithic curb may reduce some excavation to construct the median. This idea was moved to further evaluation and development. After evaluation and review of the cross sections, it was determined that excavation to construct the median and fix the crown or move the pivot point will still be needed. Since a gutter pan is not needed on the high side of the roadway, B6 curb was considered. The cost difference between B6 curb and B612 is only $1 per linear foot so this idea was lowered to a 3 and moved to a design consideration.
- Use a “joint utility trench” for all the dry utilities under the sidewalk.

- Close non-signalized intersections during construction in the vicinity - Baseline assumes 1 to 5-day closure. This idea assumes closure until majority of work is completed (non bituminous idea). This will increase the duration of the closures.
- Identify and secure contractor staging areas.
- Allow the use of reclaimed material for Class 5 material or other materials (bedding/borrow) – After investigating this idea, it was discovered that the baseline condition leaves the decision of use of reclaimed materials open for the contractor if they can achieve the standard of the material. The design assumes that some of the reclaim could be used for sidewalk bedding (embankment) but the amount of milled bituminous is much larger than what is needed on the project. Storage of the materials until needed is also an issue.

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VE Recommendation No. 1 Use Traffic Barrels	IDEA NO. 7

Baseline

Precast concrete barrier will be placed along the length of the work zone within each stage, to separate the workers from traffic.

Recommendation

Replace the concrete barrier with traffic barrels.

Advantages	Disadvantages
▪ Reduces cost ▪ Reduces construction duration ▪ Easier to shift traffic ▪ Easier to adjust access through the work zone to local businesses	▪ No positive separation between workers and traffic

Cost Summary	Cost
Baseline	$0.18 M
Recommendation	$0
Cost Savings	$0.18 x 10% markup = $0.20 M

FHWA Functional Benefit

Safety	Operations	Environment	Construction	Other
				

VE Recommendation No. 1 Use Traffic Barrels	IDEA NO. 7

Discussion/Sketches/Photos

Figure 5 – Workers placing traffic barrier

With the removal of the barrier, the movements of both general traffic and those of the contractor are improved by allowing the constraints of the work zone to be adjusted much more easily to accommodate individual movements. In doing this, access to the local business access is maintained at a higher level.

Figure 6 – Workers moving traffic barrels

Besides a cost savings for using traffic barrels instead of concrete barrier there will also be savings in contract duration because barrels can be quickly set up and reset without any specific equipment needs.

VE Recommendation No. 1 Use Traffic Barrels	IDEA NO. 7

Assumptions/Calculations

- Portable concrete barrier: $14.16/lin. ft. use $15
- Relocate portable concrete barrier: $3.17/lin. ft. use $4
    - Relocation of barrier between stages in each construction season for shifting traffic from one side of the road to the other.

traffic

**Prices from the Average Bid Prices for Awarded Projects, English Units, Spec. Year '05

From RS Means the average price for a traffic barrel is $30 each with the cost to reset and remove from the project included within other traffic control labor costs.

For a 25-30 MPH posted speed barrels are typically placed 40' apart on tangents and 20' apart on tapers. Half of the project length is approx. 1.25 miles or 6,600 LF.

6,600 LF / 40 = 165 barrels.

Assume another 165 barrels for all of the business access and cross streets for a total of 330 barrels.

Item Description	Unit	Baseline			Recommendation		
		Qty	Unit Cost	Total	Qty	Unit Cost	Total
Year 2014 Barrier	lin. ft.	2715	$15	$40,725			
Year 2014 Relocate Barrier	lin. ft.	3325	$4	$13,300			
Year 2015 Barrier	lin. ft.	3310	$15	$49,650			
Year 2015 Relocate Barrier	lin. ft.	3925	$4	$15,700			
Year 2016 Barrier	lin. ft.	4025	$15	$60,375			
Year 2016 Relocate Barrier	lin. ft.	3345	$4	$13,380			
Traffic Barrels	Each				330	$30	$9,900
Totals		**Baseline**		**$193,130**	**Recommendation**		**$9,900**
						Cost Savings	**$183,230**

VE Recommendation No. 1 Use Traffic Barrels	IDEA NO. 7

PERFORMANCE MEASURES Attributes and Rating Rationale for Recommendation	Performance	Baseline	Recommendation
Mainline Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Local Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Maintainability ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	70
Construction Impacts ▪ Reduces cost ▪ Reduces construction duration ▪ Easier to shift traffic ▪ Easier to adjust access through the work zone to local businesses	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Environmental Impacts ▪ No change to baseline	Rating	5	5
	Weight	4.8	
	Contribution	24	24
Project Schedule ▪ This should reduce the overall construction duration	Rating	5	6
	Weight	14.3	
	Contribution	71	86
Total Performance:		**500**	**544**
Net Change in Performance:			**9%**

VE Recommendation No. 2 Contractor/Business Weekly Meetings	IDEA NO. 20

Baseline

City/State provides a business liaison to keep businesses informed of schedule and construction progress.

Recommendation

This recommendation is to have the contractor designated someone, most likely the foreman or superintendent, who will give weekly updates to business owners of the expected work for that week.

Advantages	Disadvantages
▪ Provides an outreach to local businesses during construction ▪ Allows the businesses to schedule staff/deliveries accordingly ▪ Builds a relationship between contractor and the businesses	▪ Schedule changes may cause businesses to lose confidence in Contractor

Cost Summary	Cost
Baseline	$0
Recommendation	$0
Cost Savings	$0 - (Priceless to the informed business owners!)

FHWA Functional Benefit

Safety	Operations	Environment	Construction	Other
				

VE Recommendation No. 2 Contractor/Business Weekly Meetings	IDEA NO. 20

Discussion/Sketches/Photos

In a Mitigation of Construction Impacts report dated February 2009 prepared by MnDOT, improving business outreach was considered one of the most important recommendations.

The report can be found at the following link:

http://www.dot.state.mn.us/businessimpacts/pdfs/businessimpacts-report-feb2009.pdf

Instead of a "middle man" the VE Team recommends that the contractor meets with the businesses every Monday morning to relay that week's schedule of where the construction activities will be. This can occur at one of the businesses within that weeks work area.

Not all the businesses need to attend every meeting. An email can be sent out to the affected businesses on Friday letting them know where and when the meeting will take place. Within the e-mail a "street to street" general location of the affected businesses so they know whether or not their attendance might be needed.

Having the contractor conduct these meetings will make the businesses feel like they are part of the solution and allow them to make revisions to their business activities (workers, resources and deliveries) based upon the information obtained during these weekly meetings.

These meetings should be kept to a minimum duration, 30-45 minutes in length. The purpose of the meeting is for the contractor to deliver information to the businesses with minimal questions and answers. It is not intended to be a complaint session for anyone.

A contract provision would need to be written, it is suggested that the cost of providing these meetings is included within the other costs of traffic control items.

VE Recommendation No. 2 Contractor/Business Weekly Meetings		IDEA NO. 20	
PERFORMANCE MEASURES **Attributes and Rating Rationale for Recommendation**	**Performance**	**Baseline**	**Recommendation**
Mainline Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Local Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Maintainability ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	71
Construction Impacts ▪ Reduced due to communication & outreach through these meetings	Rating	5	6
	Weight	14.3	
	Contribution	71	86
Environmental Impacts ▪ No change to baseline	Rating	5	5
	Weight	4.8	
	Contribution	24	71
Project Schedule ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	71
Total Performance:		**500**	**514**
Net Change in Performance:			**3%**

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VE Recommendation No. 3a Relocate Utilities First	IDEA NO. 24

Baseline

Construction of the water main and sanitary sewer improvements will be split over the 2014, 2015, and 2016 construction seasons.

Recommendation

Develop an order of work or first order of work contract provision that requires completing the installation of the water main work along with the proposed sanitary sewer pipe and manhole replacements prior to starting work within that section of the project.

Advantages	Disadvantages
▪ Water main and sanitary sewer replacement doesn't affect overall project staging ▪ Reduces risk for the project stakeholders and contractor ▪ Above ground temporary water service connections are a big risk to the contractor ▪ Removes coordination with St. Paul Regional Water Services from the rest of the prime contractor's responsibilities ▪ Eliminates the need for the detour routes during the first construction season, reducing the total project costs for the detour ▪ Provides a more palatable project for contractors and specifically subcontractors bidding on items such as sidewalk and paving as this work would be in 2 seasons rather than spread over 3 ▪ Should eliminate any work in 2017	▪ Some business accesses will be impacted multiple times

Cost Summary	Cost
Baseline	N/Q
Recommendation	N/Q
Cost Savings	N/Q

FHWA Functional Benefit

Safety	Operations	Environment	Construction	Other
				

VE Recommendation No. 3a Relocate Utilities First	IDEA NO. 24

Discussion/Sketches/Photos

The 60% design includes construction of the water main and sanitary sewer improvements over 3 years during the 2014, 2015, and 2016 construction seasons.

2014 Season

- Water main and service connections at Annapolis, Hurley, Haskell, Bernard, Stanley, Butler, and Orme
- Replacement of sanitary sewer manholes

2015 Season

- Water main - SB Station 349+20 to Wentworth Avenue
- Water main - Logan Avenue to Orme Street
- Sanitary Sewer – SB Wentworth Avenue to Thompson Avenue

2016 Season

- Water main - SB Station 306+00 to SB Station 321+00
- Water main - SB Station 328+10 to Marie Avenue
- Water main - SB Station 342+85 SB Station 349+20
- Water main - East side of Robert Street – NB Station 128+50 to Marie Avenue

The improvements will include installation of new sanitary manholes and PVC sanitary pipe, lining of existing sanitary pipe, and replacement of water main and service connections. The main construction activities associated with this work (i.e. excavation, backfill, traffic control, etc.) will be completed by a contractor while the actual water pipe installation and service connection work will be completed by resources from the St. Paul Regional Water Services.

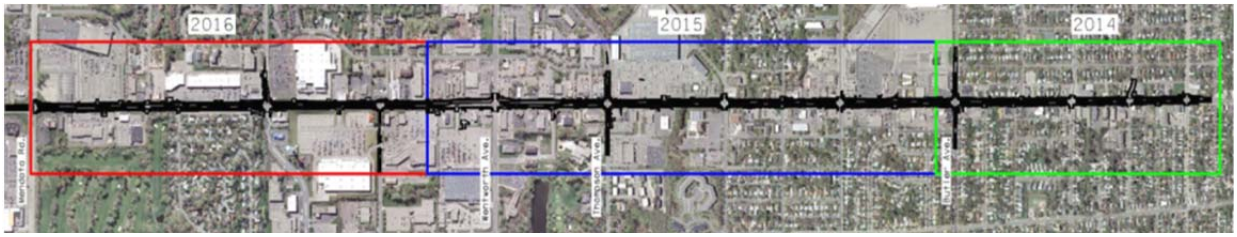

Figure 7 - Baseline Project Sequencing

This recommendation is to develop an order of work or first order of work contract provision that would require completing the installation of the new sanitary sewer pipe, sanitary manholes, water main, and service connections prior to starting other work within that section of the project. This would complete the major utility work in the 2014 season ahead of all other construction activities and would eliminate the need for the detour routes during the first season of construction.

Temporary water service will be above ground by connecting users to hydrants and water connections. Having this many pipes and/or hoses lying on the ground adjacent to and within the work area will be problematic to the contractor. By removing the water main from the rest of the work this reduces the risk of maintaining temporary water service to businesses and residents.

Completing this work prior to beginning other activities will reduce some risk to project by making this project more appealing to contractors by moving the main construction activities (i.e. curb, sidewalk, paving, signals) to two seasons rather than having them spread out over three seasons. Some

contractors may elect to not bid on the project as they may not want to commit resources to a three year project and affect their ability to bid on other projects during this timeframe.

Because of the delayed start of construction (June 2014) there is a risk that the work scheduled for 2014 between Arlington to Butler won't be completed prior to winter, resulting in some work such as the bituminous wearing course to be completed in 2015. This may cause some difficulties with snow removal and other winter maintenance operations.

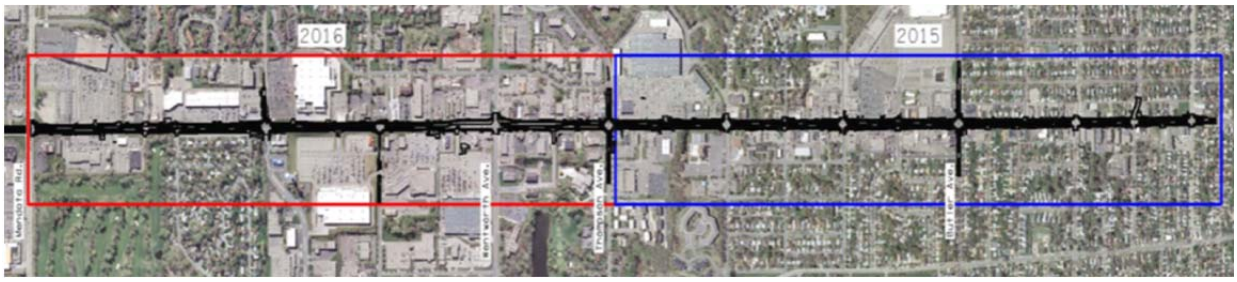

Figure 8 - Recommended Project Sequencing

This recommendation will likely be appealing to local businesses, even though it will include multiple times when construction activity in front of their businesses, it will maintain current traffic operations along Robert Street through the first year of construction. This recommendation will also likely be appealing to the transit authority.

Construction on sidewalks and other items could begin once the work zone for the water main has moved far enough down Robert Street. There should be a sufficient distance between work zone so that there is no overlap of signing and other traffic control items.

VE Recommendation No. 3a Relocate Utilities First	IDEA NO. 24

Assumptions

- Daily production rate for water main installation includes excavation, pipe install, and backfilling of the trench (as provided by Project Team). This work on the main lines could be in excess of 200 linear feet per day depending on conflicts with other utilities (per discussions with St Paul Regional Water Services).
- Daily production rate for service connections includes excavation and installation of the pipe from the main to the location of the new service connection and installation of the meter/valves/etc. associated with the new connection (base developed using RS Means, reduced based on specific project work and previous construction experience)
- Daily production rate for fire hydrants installation includes excavation and installation of the pipe from the main to the new hydrant location and placement of the new hydrant (base developed using RS Means, reduced based on specific project work and previous construction experience)
- Daily production rate for sanitary sewer installation includes excavation, pipe install, and backfilling of the trench.
- Daily production rates assume installation of new sanitary manholes will be approximately two days, including all excavation, installation, backfilling and compaction, and paving. The daily production for replacing existing manholes will be approximately 2 to 3 days, including excavation, removal and disposal of the existing manholes, installation and connection of the new manhole, backfilling and compacting, and paving. Additional time was incorporated in the production rate due to the excavation depths required.
- Testing of the new pipe can be completed within the contract working days.
- Trenches can be covered temporarily with steel plates for any new excavations within the roadway to accommodate installation and testing activities.
- Water service can be maintained to all current customers with the proposed location of the new water main.
- Water main piping and service connections will be installed and tested by the St. Paul Regional Water Services.
- Installation of the sanitary sewer and water components of the project as the first order of work will allow this work to be completed in the short 2014 season and will allow the contractor to complete the remaining hardscaping, stormwater, and roadway improvements in the 2015 and 2016 seasons, eliminating work in the 2017 season.
- Identifying this work as first order will make the job more appealing to subcontractors as the work will be confined to seasons rather than 3 plus. The overall project cost is approximately $20 M, with the work spread over 3 to 3.5 years; this may make the project unappealing to contractors resulting in a minimal number of bidders.

VE Recommendation No. 3a Relocate Utilities First	IDEA NO. 24

Calculations

The following tables were developed based on the information contained in the 60% Contract Drawings and includes approximate lengths of piping derived from scaling the pipe locations as identified in the drawings.

Table 10 – Water Main Construction

Location Beginning	Location End	Water Main (linear feet)	Fire Hydrants (each)	Service Connections (each)	Production Rate	Time (working days)
Mendota to Carol						
306+02	320+89	1487			100 LF/DAY	15
				9	4 EA/DAY	2
Carol		105			100 LF/DAY	1
Carol to Emerson						
328+14	382+93	5479			100 LF/DAY	55
				58	4 EA/DAY	15
128+65	130+73	208			100 LF/DAY	2
Marie		160			100 LF/DAY	2
Emerson to Wyoming						
389+35	402+41	1306			100 LF/DAY	13
				17	4 EA/DAY	4
Stanley		60			100 LF/DAY	1
Bernard		60			100 LF/DAY	1
Haskell		60			100 LF/DAY	1
Hurley		60			100 LF/DAY	1
Annapolis		120			100 LF/DAY	1
Project Limits						
103+86	238+03		45		1 EA/DAY	45
					Total	**157**

Table 11 – Sanitary Sewer Construction

Location Beginning	Location End	Sanitary Sewer (linear feet)	New Manholes (each)	Replace Manholes (each)	Production Rate	Time (working days)
Wentworth Avenue to Thompson Avenue						
157+30	169+22	2380			100 LF/DAY	24
			19		1 EA/3 DAYS	38
			11		1 EA/2 DAYS	11
					Total	**73**

VE Recommendation No. 3a Relocate Utilities First	IDEA NO. 24

Total working days based on installation activities as indicated above is 230 based on a linear installation approach and does not account for concurrent work activities. The total working days required to complete this work will be less as the water main and sanitary sewer pipe installations can occur concurrently; however, the work will have to be scheduled so there is not conflicting traffic control or work zone areas.

Total potential working days for water main and sanitary sewer installation:

Mobilization ~ 5 days

Water main, Hydrant, & Service Connection ~ 155 days

Sanitary Sewer and Manholes ~ 73

Roadway Cleanup and Restoration ~ 10 days

Total Working Days = 5 + 155 +73+10 = 243 days

Total construction duration in months:

Assumes all days, except Sundays are counted as working days

(243 days) ÷ (26 days/month) = 9.3 Months

Assumes all days each month are counted as working days

(243 days) ÷ (30 days/month) = 8.1 Months

There would be other minor work activities included in this work to repair sidewalk and driveways where installation of the new main impacts these, but this work can be completed within the durations and will be temporary until the Robert Street Improvement project comes through in the following year.

*The number of working days for the water main installation could be reduced by 50% based on a conversation regarding the daily production rate and installation methods with St Paul Regional Water Services.

VE Recommendation No. 3a Relocate Utilities First		IDEA NO. 24	
PERFORMANCE MEASURES **Attributes and Rating Rationale for Recommendation**	**Performance**	**Baseline**	**Recommendation**
Mainline Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Local Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Maintainability ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	71
Construction Impacts ▪ Water main and sanitary sewer replacement doesn't affect overall project staging ▪ Reduces risk for the project stakeholders and contractor ▪ Above ground temporary water service connections are a big risk to the contractor ▪ Removes coordination with St. Paul Regional Water Services from the rest of the prime contractor's responsibilities ▪ Eliminates the need for the detour routes during the first construction season, reducing the total project costs for the detour	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Environmental Impacts ▪ No change to baseline	Rating	5	5
	Weight	4.8	
	Contribution	24	71
Project Schedule ▪ Could eliminate any work in 2017 ▪ Provides a more palatable project for contractors and specifically subcontractors bidding on items such as sidewalk and paving as this work would be in 2 seasons rather than spread over 3	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Total Performance:		**500**	**544**
Net Change in Performance:			**14%**

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VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract	IDEA NO. 22

Baseline

Construction of the water main improvements will be split over the 2014, 2015, and 2016 construction seasons.

Recommendation

Develop, advertise and let a separate construction project specifically for the installation of the water main associated with the Robert Street Improvement Projects. This is a response strategy to the risk that the right-of-way will not be acquired by the project letting in April 2014 and that the project will be delayed until the right-of-way certification is approved by FHWA.

Advantages	Disadvantages
▪ Water main installation doesn't affect overall project staging ▪ Reduces risk for the project stakeholders and the Contractor ▪ Temporary service connections are a big risk to the contractor and other contract work ▪ Separate contract allows work to begin on Robert Street prior to the right-of-way certification being complete ▪ Removes coordination with St Paul Regional Water Services from the rest of the prime contractor's responsibilities	▪ Some business access locations will be impacted multiple times ▪ Coordination with two contractors when the rest of the Roberts Street Improvement project begins ▪ Two contracts to administer

Cost Summary	Cost
Baseline	N/Q
Recommendation	N/Q
Cost Savings	N/Q

FHWA Functional Benefit

Safety	Operations	Environment	Construction	Other
				

VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract	IDEA NO. 22

Discussion/Sketches/Photos

The 60% design includes construction of the water main replacement over 3 years during the 2014, 2015, and 2016 construction seasons.

2014 Season

- Connections at Annapolis, Hurley, Haskell, Bernard, Stanley, Butler, and Orme

2015 Season

- SB Station 349+20 to Wentworth Avenue
- Logan Avenue to Orme Street

2016 Season

- SB Station 306+00 to SB Station 321+00
- SB Station 328+10 to Marie Avenue
- SB Station 342+85 SB Station 349+20
- East side of Robert Street – NB Station 128+50 to Marie Avenue

The improvements will include replacement of replacement of the water main and service connections in various locations along the project corridor; the main construction activities associated with this work (i.e. excavation, backfill, traffic control, etc.) will be completed by a contractor while the actual pipe installation and service connections will be completed by resources from the St. Paul Regional Water Services. This will require close coordination between the prime contractor and SPRWS.

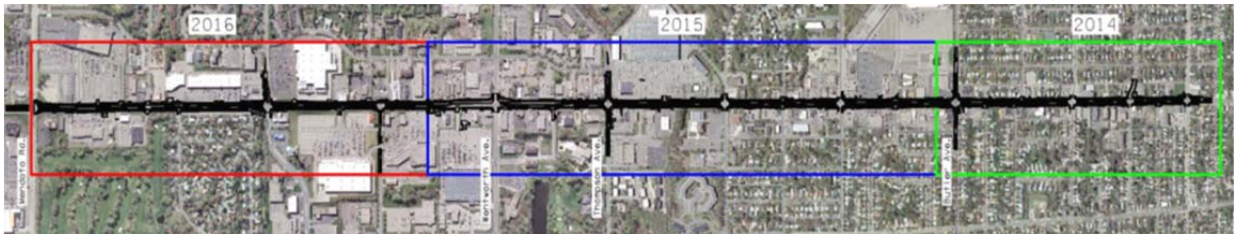

Figure 9 - Baseline Project Sequencing

This recommendation is to remove the water main construction element from the Robert Street Improvement project and develop and bid a separate construction project specifically for the installation of the water main and new service connections. This recommendation is a response strategy for the risk that the right-of-way certification will not be approved by FHWA in time to begin work on the corridor by June 2014. Because of funding requirements and the need to show the business community that work as started the project needs to begin in 2014.

This contract could be developed and bid in early 2014, allowing work to begin on the corridor prior to having Right of Way certification for the full Robert Street Improvement Project. This contract could be managed by the City of St. Paul if that would facilitate more efficient coordination.

VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract	IDEA NO. 22

Assumptions

- Daily production rate for water main installation includes excavation, pipe install, and backfilling of the trench (as provided by Project Team). This work on the main lines could be in excess of 200 linear feet per day depending on conflicts with other utilities (per discussions with St Paul Regional Water Services).
- Daily production rate for service connections includes excavation and installation of the pipe from the main to the location of the new service connection and installation of the meter/valves/etc. associated with the new connection (base developed using RS Means, reduced based on specific project work and previous construction experience)
- Daily production rate for fire hydrants installation includes excavation and installation of the pipe from the main to the new hydrant location and placement of the new hydrant (base developed using RS Means, reduced based on specific project work and previous construction experience)
- Awarding a separate contract to complete the water main replacement/installation work will allow the prime contractor to focus on completing this work and coordination with the St. Paul Region Water Services will be completed in one season rather than stretched over 3 seasons.
- Testing of the new pipe can be completed within the contract working days.
- Trenches can be covered temporarily with steel plates for any new excavations within the roadway to accommodate installation and testing activities.
- Service can be maintained to all current customers with the proposed location of the new water main.
- Water main piping and service connections will be installed and tested by the St. Paul Regional Water Services.

VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract	IDEA NO. 22

Calculations

The following table was developed based on the information contained in the 60% Contract Drawings and includes approximate lengths of piping derived from scaling the pipe locations as identified in the drawings.

Table 12 – Water Main Construction

Location		Water main	Fire Hydrants	Service Connections	Production Rate	Time
Beginning	End	(linear feet)	(each)	(each)		(working days)
Mendota to Carol						
306+02	320+89	1487			100 LF/DAY	15
				9	4 EA/DAY	2
Carol		105			100 LF/DAY	1
Carol to Emerson						
328+14	382+93	5479			100 LF/DAY	55
				58	4 EA/DAY	15
128+65	130+73	208			100 LF/DAY	2
Marie		160			100 LF/DAY	2
Emerson to Wyoming						
389+35	402+41	1306			100 LF/DAY	13
				17	4 EA/DAY	4
Stanley		60			100 LF/DAY	1
Bernard		60			100 LF/DAY	1
Haskell		60			100 LF/DAY	1
Hurley		60			100 LF/DAY	1
Annapolis		120			100 LF/DAY	1
Project Limits						
103+86	238+03		45		1 EA/DAY	45

Total working days based on installation activities as indicated above is 157 based on a linear installation approach and does not account for concurrent work activities. The total working days required to complete this work will vary slightly as some of the service installation and hydrant installation work could happen concurrently with the installation of the water main.

Total potential working days for water main installation:

Mobilization ~ 5 days

*Water main, Hydrant, & Service Connection ~ 155 days

Roadway Cleanup and Restoration ~ 10 days

Total Working Days = 5 + 155 +10 = 170 days

Total construction duration in months:

VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract	IDEA NO. 22

Assumes all days, except Sundays are counted as working days

(170 days) ÷ (26 days/month) = 6.5 Months

Assumes all days each month are counted as working days

(170 days) ÷ (30 days/month) = 5.7 Months

There would be other minor work activities included in this work to repair sidewalk and driveways where installation of the new main impacts these, but this work can be completed within the durations and will be temporary until the Robert Street Improvement project comes through during the following year.

*The number of working days for the water main installation could be reduced by 50% based on a conversation regarding the daily production rate and installation methods with St Paul Regional Water Services.

VE Recommendation No. 3b Risk Mitigation - Separate Water Main Contract		IDEA NO. 22	
PERFORMANCE MEASURES **Attributes and Rating Rationale for Recommendation**	**Performance**	**Baseline**	**Recommendation**
Mainline Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Local Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Maintainability ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	71
Construction Impacts ▪ Reduces the total amount of time that construction activities are going on in front of a business	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Environmental Impacts ▪ No change to baseline	Rating	5	5
	Weight	4.8	
	Contribution	24	71
Project Schedule ▪ This will mitigate a risk that the project start is delayed	Rating	5	6
	Weight	14.3	
	Contribution	71	86
Total Performance:		**500**	**544**
Net Change in Performance:			**9%**

VE Recommendation No. 4 Innovative Contracting	IDEA NO. 9, 13, 14, 32

Baseline

The project will be advertised using design-bid-build contracting method.

Recommendation

To receive the best "value" for the project incorporate innovative contracting methods within the design-bid-build project delivery to reduce the overall duration of the project.

Advantages	Disadvantages
▪ **Innovative contracting methods** (see next section) ▪ **Pre-bid meeting** o Builds a better relationship between the contractor and the agency o Highlights project/contract requirements that the Contractor must plan for and consider in bid (i.e. MOT and TPAR)	▪ **Innovative contracting methods** (see next section) ▪ **Pre-bid meeting** o Not a mandatory meeting, so all Contractors might not attend

Cost Summary	Cost
Baseline	N/Q
Recommendation	N/Q
Cost Savings	N/Q

FHWA Functional Benefit

Safety	Operations	Environment	Construction	Other
				

VE Recommendation No. 4 Innovative Contracting	IDEA NO. 9, 13, 14, 32

Discussion/Sketches/Photos

State and local transportation agencies (DOTs) are increasingly exploring ways to complete highway projects faster while meeting stringent cost, quality, and safety performance measures. DOTs must take into account project characteristics such as project size (cost), type (preservation, rehabilitation, or reconstruction), and complexity (urban or rural, significant traffic impact, number of project elements) when evaluating innovative contracting options that promote accelerated project completion or facilitate achievement of other performance objectives.

Most innovative contracting methods change how DOTs procure and deliver a project, using the traditional design-bid-build delivery approach as the benchmark. Contracting alternatives that should be considered for use on this project include:

- Cost-plus-time bidding (A+B) aims to expedite project completion through competitive bidding on the construction time (days). A+B bidding is used on projects with significant impacts to motorists, businesses, emergency services or other groups that will be directly impacted by the project.
- Alternative Technical Concept (ATC) provides a mechanism that allows Contractors to propose changes to the plans during the bidding phase. The ATC approach promotes competition and the exchange innovative approaches early in the design process, giving DOTs the opportunity to select proven design and construction solutions that offer the best value.
- Best-Value Contracting allows the owner to consider other factors in addition to price in the award and execution of construction contracts. Best value procurement is most useful when a project has unique objectives or challenges that may be difficult to meet using traditional low-bid procurement.
- Lane rental encourages contractors to minimize road user impacts during construction by restricting lane use.

Because of the significance of the business and pedestrian impacts, it is recommended that a pre-bid meeting be held for plan-holders. The focus of the meeting would be on construction staging, maintenance of traffic, business impact management, Temporary Pedestrian Access Routes (TPAR) and to discuss innovative contracting if a method is selected for use on this project.

Information presented will be highlighted areas of the plans/specs regarding these items. It is important to stress the significance of these items, and to communicate to the Contractor that communication with the businesses, as well as access for businesses and pedestrians, is something they need to incorporate into their work and in their estimate for the project.

Attendance at the pre-bid meeting should include the Project Engineer, MnDOT Traffic representative, City of West St. Paul representative, Project Manager, and MnDOT Area representative.

VE Recommendation No. 4 Innovative Contracting			IDEA NO. 9, 13, 14, 32
Innovative Contracting Method	**Description**	**Pros**	**Cons**
A+B	A+B bidding factors time plus cost to determine the low bid. Under the A+B method, each submitted bid has two components: A - dollar amount for contract items B – calendar days required to complete project Calendar days are multiplied by a road user cost, furnished by the owner, and added to the A component to obtain the total bid: **A + (B x road user cost per day) = total bid** The formula only determines the lowest bid for award and not the payment to the contractor. A+B can be an effective technique to reduce delays for critical projects with high road use. Contracts incorporate a disincentive provision assessing road user costs to discourage contractors from exceeding the time bid. Contracts may include an incentive provision to reward contractors if work is completed in fewer days than bid. Generally, MnDOT specifies a maximum incentive.	▪ Earlier completion of project ▪ Contractor's schedule must minimize construction time and delays ▪ Contractor must coordinate with subcontractors to meet time constraints	▪ Contractor must take time to develop a reliable schedule ▪ Contract changes are magnified; too many changes nullify advantages of A+B ▪ More resources may be required for contract administration ▪ More intense negotiations for additional work because timeliness is critical
Alternative Technical Concept	The effective use of this concept can align incentives for both the contractor and the owner to develop ideas which remove inefficiencies or constructability problems in the design, and improve the project by reducing costs, time, and risks of adverse outcomes for all concerned. The incentive for an owner to include the provision for ATC proposals is to encourage contractor to develop innovations to help reduce cost or schedule and improve value. The owner benefits from reduced costs and/or construction impact duration. For this project, ATC's would only be allowed for staging and maintenance of traffic. MnDOT and the City would review the proposed ATC's and respond with: Approved, Not Approved, Conditionally Approved, or Not an ATC (allowed by contract)	▪ Encourage Contractor innovation which can save time and cost	▪ ATC approval process might be difficult due to all the stakeholders that may be involved (MnDOT, City, SPRWS) ▪ MnDOT has not been able to implement ATC's on DBB projects in the past ▪ Requires additional advertising time ▪ All traffic control items must be lump sum

VE Recommendation No. 4 Innovative Contracting			IDEA NO. 9, 13, 14, 32
Innovative Contracting Method	**Description**	**Pros**	**Cons**
A+B and ATC	A combination of A+B and ATC's	▪ Encourage Contractor innovation which can save time and cost. ▪ Potential for best qualified Contractors would be evaluated higher ▪ Adding ATC's may eliminate some cons of the A+B alone. ▪ Adding A+B to ATC would provide incentive for Contractor to develop time-saving (even if not cost-saving) improvements	▪ May be too late in the process for this contracting method. ▪ Involvement with Office of Innovative Contracting and FHWA typically begins at 30% plan completion
Best Value	Best-Value is a procurement process where price and other key factors can be considered in the evaluation and selection process to minimize impacts and enhance the long-term performance and value of construction. Evaluation criteria must include price and may include time, staging, and qualifications.	▪ Encourage Contractor innovation which can save time and cost. ▪ Potential for best qualified Contractors would be evaluated higher	▪ May be too late in the process for this contracting method. ▪ Involvement with Office of Innovative Contracting and FHWA typically begins at 30% plan completion

VE Recommendation No. 4 Innovative Contracting		IDEA NO. 9, 13, 14, 32	
PERFORMANCE MEASURES **Attributes and Rating Rationale for Recommendation**	**Performance**	**Baseline**	**Recommendation**
Mainline Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Local Operations ▪ No change to baseline	Rating	5	5
	Weight	26.2	
	Contribution	131	131
Maintainability ▪ No change to baseline	Rating	5	5
	Weight	14.3	
	Contribution	71	71
Construction Impacts ▪ Innovative contracting should minimize construction impacts	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Environmental Impacts ▪ No change to baseline	Rating	5	5
	Weight	4.8	
	Contribution	24	24
Project Schedule ▪ Innovative contracting should decrease the construction duration	Rating	5	7
	Weight	14.3	
	Contribution	71	100
Total Performance:		**500**	**557**
Net Change in Performance:			**11%**

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Appendix A

Value Engineering Recommendation Approval Form

Project: TH 952A, Robert Street Improvement Project - SP 1908-84

VE Study Date: September 10-13, 2013

	Recommendation	Accept	Reject	Accept for further review	Reason (Or use the pages at the end of this memo)	FHWA Functional Benefit: Safety	Operations	Environment	Construction	Other	Estimated Savings ($million)	Added Cost ($million)
1	Use Traffic Barrels	X							x		$ 0.20	
2	Contractor/Business Weekly Meetings	X							x			
3a	Relocate Utilities First			X					x			
3b	Risk Mitigation – Separate Utility Contract		X						x			
4	Innovative Contracting	X							x			
					Total for 4 recommendations	0	0	0	4	0	$ 0.20	$0
					Total for 4 accepted recommendations	0	0	0	4	0	$ 0.20	$0

Please provide justification if the value engineering study recommendations are **not** approved or are implemented in a modified form.

MnDOT is required to report Value Engineering results annually to FHWA. To facilitate this reporting requirement, a Value Engineering Recommendation Approval Form is included in the Appendix of this report. If the region elects to reject or modify a recommendation, please include a brief explanation of why. Please complete the form and return it to Minnie Milkert, MnDOT State Value Engineer, MS 696

Signature Project Manager

7 – October 2013
Date

Jon P. Solberg
Name (please print)

Reason for Acceptance or Rejection of Recommendation

1. Use traffic barrels.

   This recommendation is acceptable and can be easily implemented in the final design plans.

2. Weekly contractor/business owner meetings.

   This recommendation is acceptable and will be made part of the project requirements/specifications.

3. Utilities:
   a. Relocate the utilities first (under project specifications schedule)
   b. Risk Mitigation – Let a Separate Utility Contract

   The City is somewhat concerned about implementing either of these recommendations due to the following factors:

   - Additional temporary pavement, curb and sidewalk restoration will be necessary to allow the roadway to be opened as they finish each section. These costs are not budgeted and would not occur if the utilities were done at the same time as the roadway. It is estimated to add approximately $500,000 to the project costs.
   - St Paul Regional Water Services have indicated that their water main crews and temporary water service materials may not be available due to the sheer amount of water main work proposed already in 2014. There are nearly 10 miles of water main replacement in other programmed city, county, and state projects in 2014. The ability to dedicate the two full time crews that would be needed for this effort will be challenging. (Note: Their policy is that the agency contractor excavates the trench and backfills, but St. Paul Water crews actually install the pipe.)
   - Business owners will be subject to multiple years of construction in areas that sewer and water are being replaced. They have been informed previously that they would only be impacted for one year.

- Certain temporary items such as bituminous curb and sidewalks are more susceptible to winter damage due to snow removal operations and equipment.
- If the advance bid package is done by a different contractor than the roadway, warranty deficiencies can become an issue between contractors (i.e., settlements over utility trenches, etc.). Often, there tends to be a lot of "finger pointing" as to if the warranty related damages were caused by the utility contractor or paving contractor.
- Private utility relocations will be difficult, as they generally prefer to complete this work when the roadway is under construction to reduce their overall construction costs for restoring pavement, sidewalk, etc.
- Temporary water service (above ground hose connections) is highly weather dependent. Temporary service can only be placed reliably between May 15 and November 1. Anything past those dates is a higher risk. It has been done successfully outside of these dates in the past, but it has also failed (i.e., frozen/cracked temporary mains that put customers out of water for two-plus days). While temporary water services will be needed anyway, due to the large volume of work to be done if the utilities are constructed separately, it may not get finished due to temperature concerns in the late fall.
- St Paul Water is concerned about the willingness of the contractor to place an emphasis on the completing the water in a timely fashion. . Frequently, St. Paul water crews are sidelined on a project due to the excavation contractor pulling off of the water excavation to do other work, such as sewer or storm. If one, possibly two, full time water main crews are going to be dedicated to the advance utility work, then the understanding that those crews should work straight through the project must be addressed in the project specifications and contract management. Their experience has shown that this does not happen as well as planned.
- Based on the above concerns, this recommendation is rejected. St. Paul Water Services does not have sufficient crews to construct all the water main in 2014, additionally the amount of temporary work may result in more costs than time savings to the project. The only benefit that the City sees in doing this is to allow work to proceed in 2014 if there are any delays in getting the roadway plans completed or approved by MnDot or if there are delays in the right of way acquisition schedule. The City will continue to monitor the progress of the plans and approvals and if schedule slippage becomes a concern, they will re-evaluate this option.

4. Innovative contracting

   The City would be agreeable to exploring alternative bidding methods (i.e., A+ B Bidding, Alternative Technical Concepts, Incentives/Disincentives, etc.). They would look for direction from MnDOT on guidance on this item and for the standard contract language that should be put into the bidding documents for the method of contracting selected. The City suggests that a meeting be scheduled with MnDot Construction Services to further explore the benefits of implementing alternative biding options.

FHWA Functional Benefit Criteria

Each year, State DOT's are required to report on VE recommendations to FHWA. In addition to cost implications, FHWA requires the DOT's to evaluate each approved recommendation in terms of the project feature or features that recommendation benefits. If a specific recommendation can be shown to provide benefit to more than one feature described below, count the recommendation in **each category that is applicable**.

Safety: Recommendations that mitigate or reduce hazards on the facility
Operations: Recommendations that improve real-time service and/or local, corridor, or regional levels of service of the facility.
Environment: Recommendations that successfully avoid or mitigate impacts to natural and or cultural resources.
Construction: Recommendations that improve work zone conditions, or expedite the project delivery.
Other: Recommendations not readily categorized by the above performance indicators.

Appendix B

VE Study Agenda

SP 1908-84 - Value Engineering Study
TH 952A, Robert St. (from Mendota Rd to Annapolis St.)
Tuesday September 10 – Friday September 13, 2013

Tues – Thurs.: Maryland Ave. Truck Station; 244 East Maryland Ave.; St. Paul, MN 55117
Fri.: Waters Edge Building; 1500 W. County Road B-2; Roseville, MN 55113-3174

Value Engineering Study Agenda

Tuesday, Sept. 10: MnDOT Maryland Ave. Truck Station

8:00 am	Welcome and Introductions • Overview and training of VE Process
	Information Phase
8:45 am	Design Teams presentation of the project • Virtual site visit (Google Earth) • What are the goals and objectives? • What are the constraints and controlling decisions? • What are the assumptions? • What are the risk have been identified?
9:45 am	Define and Weigh Performance Attributes
	Functional Analysis Phase
10:15 am	Functional Analysis - development and training
	Creative Phase
10:45 am	Begin to Brainstorm ideas to improve the value of the project
Noon	Site Visit – Lunch along the way
about 3:30 pm	Site Visit Observations
4:00 am	Continue Speculation
5:00 pm	Adjourn for the day

Wednesday, Sept. 11	(Bring Laptops if you have them)
8:00 am	Continue Speculation and move into Evaluation Phase
	Evaluation Phase
10:00 am	Define the advantages and disadvantages of the ideas
Noon	Lunch
1:00 pm	Complete the Evaluation Phase
4:30 pm	Assign recommendations to team members for development

5:00 pm	Adjourn for the day

Thursday, Sept. 12 (Bring Laptops if you have them)

Development Phase

8:00 am	Develop the ideas that evaluated the best into recommendations
Noon	Lunch
1:00 pm	Continue Development Phase
4:00 pm	Define and evaluate the performance of recommendations
5:00 pm	Adjourn for the day

Friday, Sept. 13: MnDOT Waters Edge

8:00 am	VE Team Review of Recommendations (if time permits)

Presentation Phase

9:15 am	VE Team practice walk-through presentation
10:00 am	Presentation of VE Findings
Noon	Adjourn

Appendix C

				VE Study Attendees **TH 952A, Robert Street Improvements** **SP 1908-84**				
2013 September				**NAME**	**ORGANIZATION**	**POSITION/DISCIPLINE**	**TELEPHONE**	
							Office	**Cell**
							E-MAIL	
10	**11**	**12**	**13**					
✓	✓	✓	✓	Michael Arseneau	MnDOT	Design	(651) 234-7652	
							michael.arseneau@state.mn.us	
✓				Liz Benjamin	MnDOT	Construction		
							elizabeth.benjamin@state.mn.us	
✓				Lynne Bly	MnDOT	Multi-Model Planning		
							lynne.bly@state.mn.us	
✓	✓	✓	✓	Tiffany Dagon	MnDOT	Traffic		
							tiffany.dagon@state.mn.us	
✓			✓	David Juliff	SRF Consulting	Project Manager	(763) 249-6718	
							djuliff@srfconsulting.com	
✓	✓			Jim Gersema	SRF Consulting		(763) 249-6748	
							jgersema@srfconsulting.com	
✓	✓	✓	✓	Curtiss Kallio	MnDOT	Construction		
							curt.kallio@state.mn.us	
✓				Molly Kline	MnDOT	Maintenance	(651) 234-7909	
							molly.kline@state.mn.us	

VE Study Attendees

TH 952A, Robert Street Improvements
SP 1908-84

2013 September				NAME	ORGANIZATION	POSITION/DISCIPLINE	TELEPHONE	
							Office	Cell
10	11	12	13				E-MAIL	
✓	✓	✓	✓	Blane Long	HDR Engineering	VE Team Leader	(360) 570-4411	(360) 742-7682
							Blane.Long@hdrinc.com	
✓	✓	✓	✓	Josh Metcalf	HDR Engineering	Design/Construction	(360) 570-4417	(360) 239-9516
							Josh.Metcalf@hdrinc.com	
✓			✓	Minnie Milkert	MnDOT	State Value Engineer	(651) 366-4648	(651) 336-3657
							minnie.milkert@state.mn.us	
✓				Gina Mitteco	MnDOT	Bikes and Pedestrians		
							gina.mitteco@state.mn.us	
✓				Jenny Morris	MnDOT	Project Management		
							jenny.morris@state.mn.us	
✓	✓	✓	✓	Almin Ramic	MnDOT	Geometrics	(651) 366-4673	
							almin.ramic@state.mn.us	
✓				James Rosenow	MnDOT	Flexible Design	(651) 366-4673	
							james.rosenow@state.mn.us	
✓			✓	Matt Saam	City of West St. Paul		(651) 552-4130	
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				VE Study Attendees **TH 952A, Robert Street Improvements** **SP 1908-84**				
2013 September				**NAME**	**ORGANIZATION**	**POSITION/DISCIPLINE**	**TELEPHONE**	
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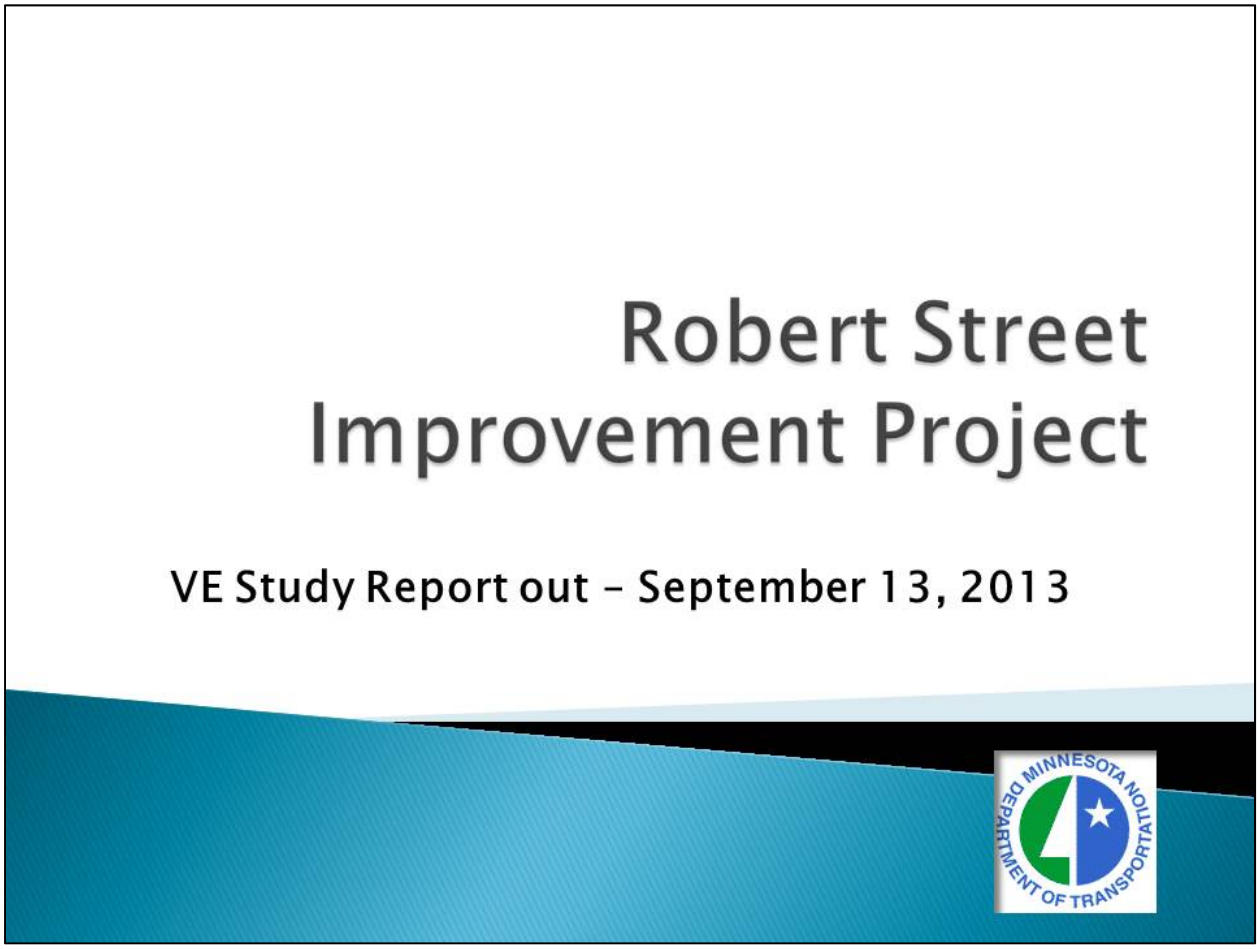
Appendix D

VE Study Report-Out Presentation

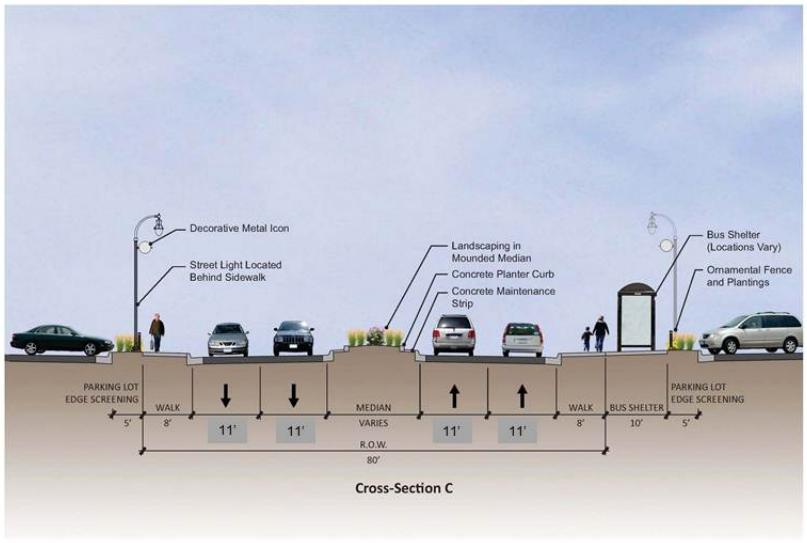


Primary Project Goals

Robert Street Project Goals:

- ✓Make Needed Safety Improvements
- ✓Address Aging Infrastructure
- ✓Improve Overall Image and Vision of Corridor
- ✓Accommodate All Users and Modes

Typical Section



Goals and Objectives of this workshop

- Use a "fresh set of eyes" to search for new/innovative approaches to constructability, construction staging and traffic control
- Identify potential value added and cost saving opportunities

Constraints

- 80' right-of-way
- Project needs to be let by April 2014
- Maintain 2-lanes in one direction on Robert Street during construction
- Maintain pedestrian path during construction

Constraints

- Maintain access to businesses during construction
- Maintain a business detour during construction
- Maintain a bypass detour during construction
- Maintain a bus detour during construction

Project Delivery Schedule

- Bid Opening – April 2014
- Begin Construction – June 2014

Project Delivery Schedule

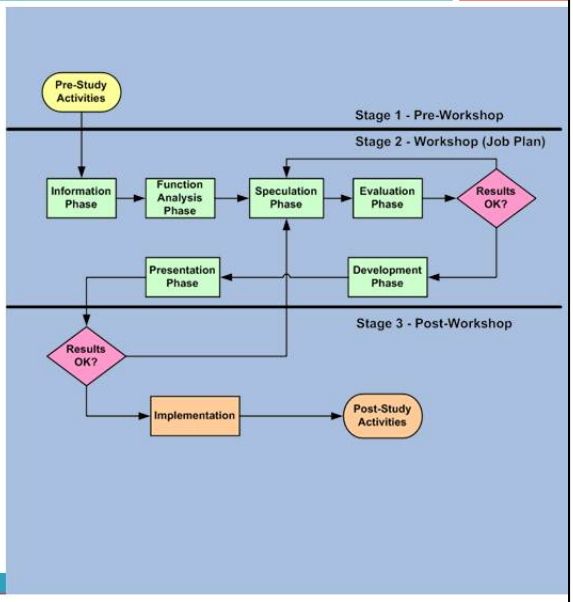
- 2014 – Construct improvements off Robert St., incl. parallel route improvements, temporary signals, shared access, and the roundabout at Oakdale and Wentworth. In addition, construct Robert St. between Annapolis and Butler.

Project Delivery

- 2015 – Construct Robert Street from Butler to Wentworth.
- 2016 – Construct Robert Street from Wentworth to Mendota Rd.
- 2017 – Final clean up, punch list items, remaining landscaping.

JOB PLAN

- Provides the structure for the Value Study which is part of a 3-stage process
  1. Pre-Workshop
  2. Value Study
  3. Post-Workshop



HDR

Recommendation #1

- Use Traffic Barrels

MINNESOTA DEPARTMENT OF TRANSPORTATION

Recommendation #2

- Contractor/Businesses – Weekly Meetings

MINNESOTA DEPARTMENT OF TRANSPORTATION

Recommendation #3a

- Relocate Utilities First

Recommendation #3b

- Risk Mitigation – Separate Utilities Contract

Recommendation #4

- Innovative Contracting

Design Considerations

- Sign the bypass route only once, cover signs in winter
- Conduct a constructability review using contractors ASAP
- Cut back the staging details, and let the contractor determine the traffic control based upon the constraints (performance specs)
- Utilize as much as possible the existing signal poles for temporary signals

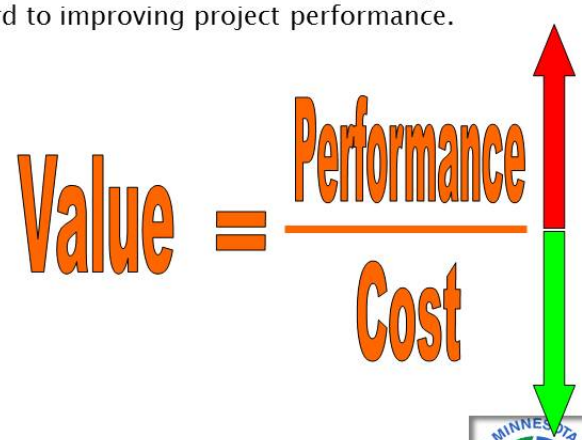
Design Considerations

- Use Monolithic or Barrier (B6) curb for the median islands
- Use a "joint utility trench" for all the dry utilities under the sidewalk
- Close non-signalized intersections during construction in the vicinity
- Provide (secure) contractor staging areas

Performance Attributes

Value Analysis has traditionally been perceived as an effective means for reducing project costs. This paradigm only addresses one part of the value equation, often times at the expense of overlooking the role that VE can play with regard to improving project performance.

- **Mainline Operations**
- **Local Operations**
- **Maintainability**
- **Construction Impacts**
- **Environmental Impacts**
- **Project Schedule**



Recommendation Summary

Table 6 – Summary of Recommendations

#	Description	Cost Savings	Schedule Savings	Performance
1	Use Traffic Barrels	$0.20 M	1-2 weeks	9%
2	Contractor/Business Weekly Meetings	None	None	3%
3a	Relocate Utilities First	N/Q	6 months	11%
3b	Risk Mitigation – Separate Utility Contract	N/Q	N/Q	9%
4	Innovative Contracting	N/Q	6 months	11%
	Total	$0.20 M	6 months	

Value Improvement

	OVERALL PERFORMANCE	Performance (P)	% Change Performance	Cost (C)	% Change Cost	Value Index (P/C)	% Value Improvement
	Baseline	500		$15.3		32.62	
1	Eliminate Temporary Barrier	543	9%	$15.1	1%	35.88	10%
2	Contractor/Business Weekly Meetings	514	3%	$15.3	0%	33.55	3%
3a	Relocate Utilities First	557	11%	$15.3	0%	36.34	11%
3b	Risk Mitigation – Separate Utility Contract	543	9%	$15.3	0%	35.41	9%
4	Innovative Contracting	557	11%	$15.3	0%	36.34	11%

Questions?

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Appendix E

Value Engineering Process

Value Engineering (VE) is a systematic process using a multidisciplinary team to improve the value of a project through the analysis of its functions. The VE process incorporates, to the extent possible, the values of design; construction; maintenance; contractor; state, local and federal approval agencies; other stakeholders; and the public.

The primary objective of a VE Study is value improvement. The value improvements might relate to scope definition, functional design, constructability, coordination (both internal and external), or the schedule for project development. Other possible value improvements are reduced environmental impacts, reduced public inconvenience, or reduced project cost.

Pre-VE Study

Prior to the start of a VE Study, the Project Manager, VE Team Leader, and the State Value Engineering Coordinator carry out the following three activities:

- Initiate Study
  - Prepare VE Study request
  - Define scope, objective and goals of the study
  - Define study timing
- Organize Study
  - Conduct Pre-Study meeting
  - Select team members
  - Pre-elicit risks (if applicable)
  - Identify performance attributes (if applicable)
- Prepare Data
  - Collect and distribute data
  - Prepare cost models
  - Prep for study.

All of the information gathered prior to the VE Study is given to the team members for their use.

Value Engineering Job Plan

The Value Engineering Job Plan was employed in analyzing the project. This process is recommended by SAVE International and is composed of the following phases:

Information - The objective of this phase was to obtain a thorough understanding of the project's design criteria and objectives by reviewing the project's documents and drawings, cost estimates, and schedules.

Functional Analysis - The purpose of this phase was to identify and define the primary and secondary functions of the project. A Functional Analysis System Technique (FAST) was used to quickly define the functions of the project.

Creative/Speculation - During this phase the team employed creative techniques such as team brainstorming to develop a number of alternative concepts that satisfy the project's primary functions.

Evaluation - The purpose of this phase was to evaluate the alternative concepts developed by the VE Team during the brainstorming sessions. The team used a number of tools to determine the qualitative and quantitative merits of each concept.

Development - Those concepts that ranked highest in the evaluation were further developed into VE recommendations. Narratives, drawings, calculations, and cost estimates were prepared for each recommendation.

Presentation - The VE Team presented their finding in the form of a written report. In addition, an oral presentation was made to the owner and the design team to discuss the VE recommendations.

Implementation/Resolution - Evaluate, resolve, document and implement all approved recommendations.

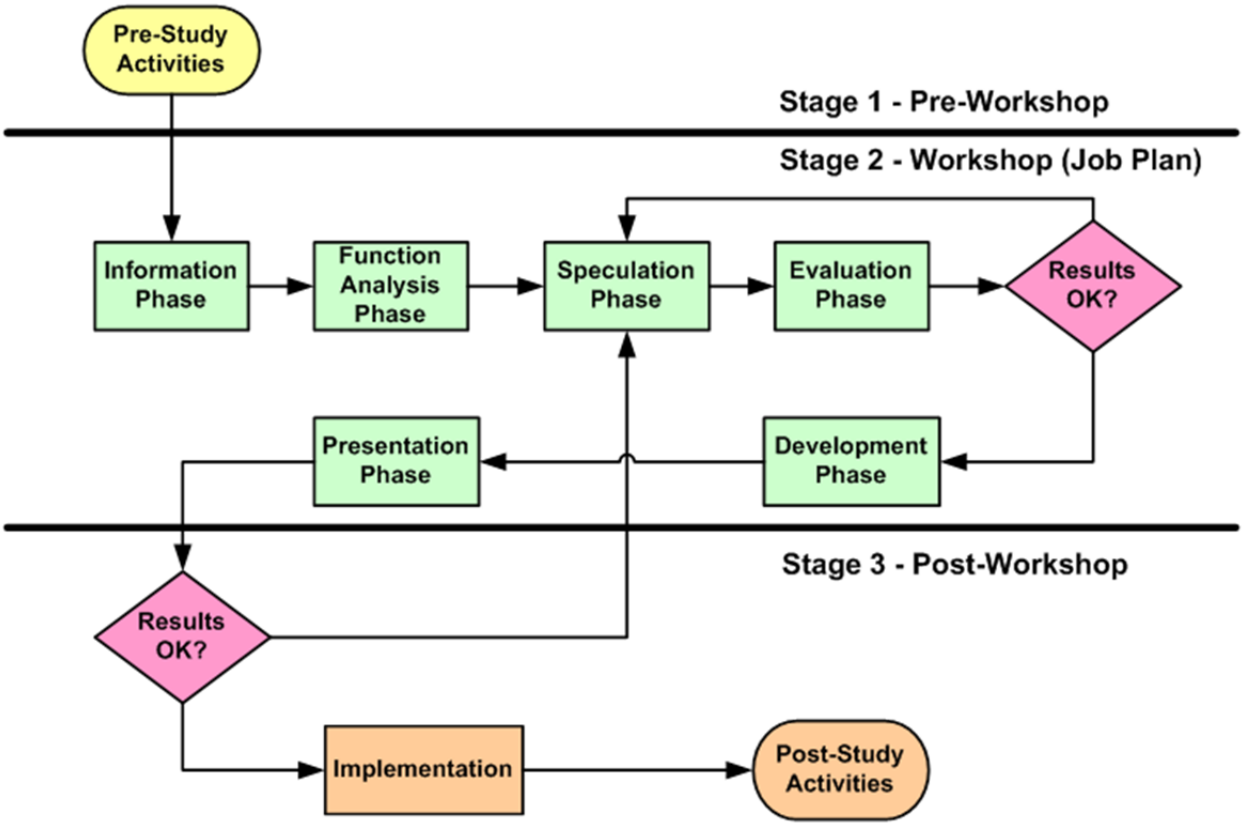

Figure 10 – Value Engineering Job Plan

Performance Based Results

Using performance attributes process is an integral part of the value engineering process. This process provides the cornerstone of the VE process by providing a systematic and structured means of considering the relationship of a project's performance and cost as they relate to value. Project performance must be properly defined and agreed upon by the stakeholders at the beginning of the value study. The performance attributes and requirements developed are then used throughout the study to identify, evaluate, and document alternatives.

Introduction

The methodology described herein measures project value by correlating the performance of project scope and schedule to the project costs. The objective of this methodology is to prescribe a systematic, structured approach to study and optimize a project's scope, schedule, and cost.

Value engineering has traditionally been perceived as an effective means for reducing project costs. This paradigm only addresses one part of the value equation, oftentimes at the expense of overlooking the role that VE can play with regard to improving project performance. Project costs are fairly easy to quantify and compare through traditional estimating techniques. Performance is not so easily quantifiable.

The VE Team Leader will lead the team and external stakeholders through the methodology, using the power of the process to distill subjective thought into an objective language that everyone can relate to and understand. The dialog that develops forms the basis for the VE Team understanding of the performance requirements of the project and to what degree the current design concept is meeting those requirements. From this baseline, the VE Team can focus on developing alternative concepts that will quantify both performance and cost and contribute to overall project value.

Performance based value engineering yields the following benefits:

- Builds consensus among project stakeholders (especially those holding conflicting views)
- Develops a better understanding of a project's goals and objectives
- Develops a baseline understanding of how the project is meeting performance goals and objectives
- Identifies areas where project performance can be improved through the VE process
- Develops a better understanding of a VE recommendation's effect on project performance
- Develops an understanding of the relationship between performance and cost in determining value
- Uses value as the true measurement for the basis of selecting the right project or design concept
- Provides decision makers with a means of comparing costs and performance (i.e., costs vs. benefits) in a way that can assist them in making better decisions.

Methodology

The application of performance based value engineering consists of the following steps:

1. Identify key project (scope and delivery) performance attributes and requirements for the project

2. Establish the hierarchy and impact of these attributes upon the project
3. Establish the baseline of the current project performance by evaluating and rating the effectiveness of the current design concepts
4. Identify the change in performance of alternative project concepts generated by the study
5. Measure the aggregate effect of alternative concepts relative to the baseline project's performance as a measure of overall value improvement

The primary goal of value engineering is to improve project value. A simple way to think of value in terms of an equation is as follows:

$$Value = \frac{Performance}{Cost}$$

Assumptions

Before embarking on the details of this methodology some assumptions need to be identified. The methodology described in the following steps assumes the project functions are well established. Project functions are "the what" the project delivers to its users and stakeholders; a good reference for the project functions can be found in the environmental document's purpose and need statement. Project functions are generally well defined prior to the start of the value study. In the event that project functions have been substantially modified, the methodology must begin a new from the beginning (Step 1).

Step 1 – Determine the Major Performance Attributes

Performance attributes can generally be divided between Project Scope components (Highway Operations, Environmental Impacts, and System Preservation) and Project Delivery components.

It is important to make a distinction between performance attributes and performance requirements. Performance requirements are mandatory. All performance requirements MUST be met by any idea being considered.

Performance attributes possess a range of acceptable levels of performance. For example, if the project was the design and construction of a new bridge, a performance requirement might be that the bridge must meet all current seismic design criteria. In contrast, a performance attribute might be Project Schedule which means that a wide range of alternatives could be acceptable that had different durations.

The VE Team Leader will initially request that representatives from Project Team and external stakeholders identify performance attributes that they feel are essential to meeting the overall need and purpose of the project. Usually four to seven attributes are selected. It is important that all potential attributes be thoroughly discussed.

The information that comes out of this discussion will be valuable to both the VE Team and the Project Owner. It is important that the attribute be discretely defined, and they must be quantifiable in some form. By quantifiable, it is meant that a useable scale must be delineated with values given on a scale of 0 to 10. A "0" indicates unacceptable performance, while a "10" indicates optimal or ideal performance. The vast majority of performance attributes that typically appear in transportation value studies have

been standardized. This standardized list can be used "as is" or adopted with minor adjustments as required. Every effort should be made to make the ratings as objective as possible.

Step 2 – Determine the Relative Importance of the Attributes
Once the group has agreed upon the project's performance attributes, the next step is to determine their relative importance in relation to each other. This is accomplished through the use of an evaluative tool termed in this report as the "Performance Attribute Matrix."

This matrix compares the performance attributes in pairs, asking the question: "An improvement in which attribute will provide the greatest benefit to the project relative to purpose and need?" A letter code (e.g., "a") is entered into the matrix for each pair, identifying which of the two is more important. If a pair of attributes is considered to be of essentially equal importance, both letters (e.g., "a/b") are entered into the appropriate box. This, however, should be discouraged, as it has been found that in practice a tie usually indicates that the pairs have not been adequately discussed.

When all pairs have been discussed, the number of "votes" for each is tallied and percentages (which will be used as weighted multipliers later in the process) are calculated. It is not uncommon for one attribute to not receive any "votes." If this occurs, the attribute is given a token "vote", as it made the list in the first place and should be given some degree of importance.

Step 3 – Establish the Performance "Baseline" for the Original Design
The next step is to define the baseline as it pertains to each performance attribute. The baseline is then given a score of 5 on a scale of 0 to 10 for each attribute.

Step 4 – Evaluate the Performance of the VE Recommendations
Once the performance of the baseline has been established for the original design concept, it can be used to help the VE Team develop performance ratings for individual VE recommendations as they are developed during the course of the value study. The Performance Measures form at the back of each recommendation is used to capture this information.

It is important to consider the recommendation's impact on the entire project, rather than on discrete components.

Step 5 – Compare the Performance Ratings of Recommendations to the "Baseline" Project
The last step in the process is to develop the performance ratings for the original design concept. The VE Team groups the recommendation into a scenario (or scenarios) to provide the decision makers a clear picture of how the recommendations fit together into possible solutions. At least one scenario is developed to present the VE Team's consensus of what should be implemented. Additional scenarios are developed as necessary to present other combinations to the decision makers that should be considered. The scenario(s) of VE recommendations are rated and compared against the original concept. The performance ratings developed for the VE Scenarios are entered into the matrix, and the summary portion of is completed. The summary provides details on net changes to cost, performance, and value, using the following calculations.

- % Performance Improvement = Δ Performance VE Strategy / Total Performance Original Concept
- Value Index = Total Performance / Total Cost (in Millions)
- % Value Improvement = Δ Value Index VE Strategy / Value Index Original Concept

Reporting

Following the VE Study, the Team Leader assembles all study documentation into the draft/final reports:

- Publish Results – Prepare a draft and a final VE Study Report; distribute printed and electronic copies as needed.

The VE Study is complete when the report is issued as a record of the VE Team's analysis and development work, as well as the Project Team's implementation dispositions for the recommendations.